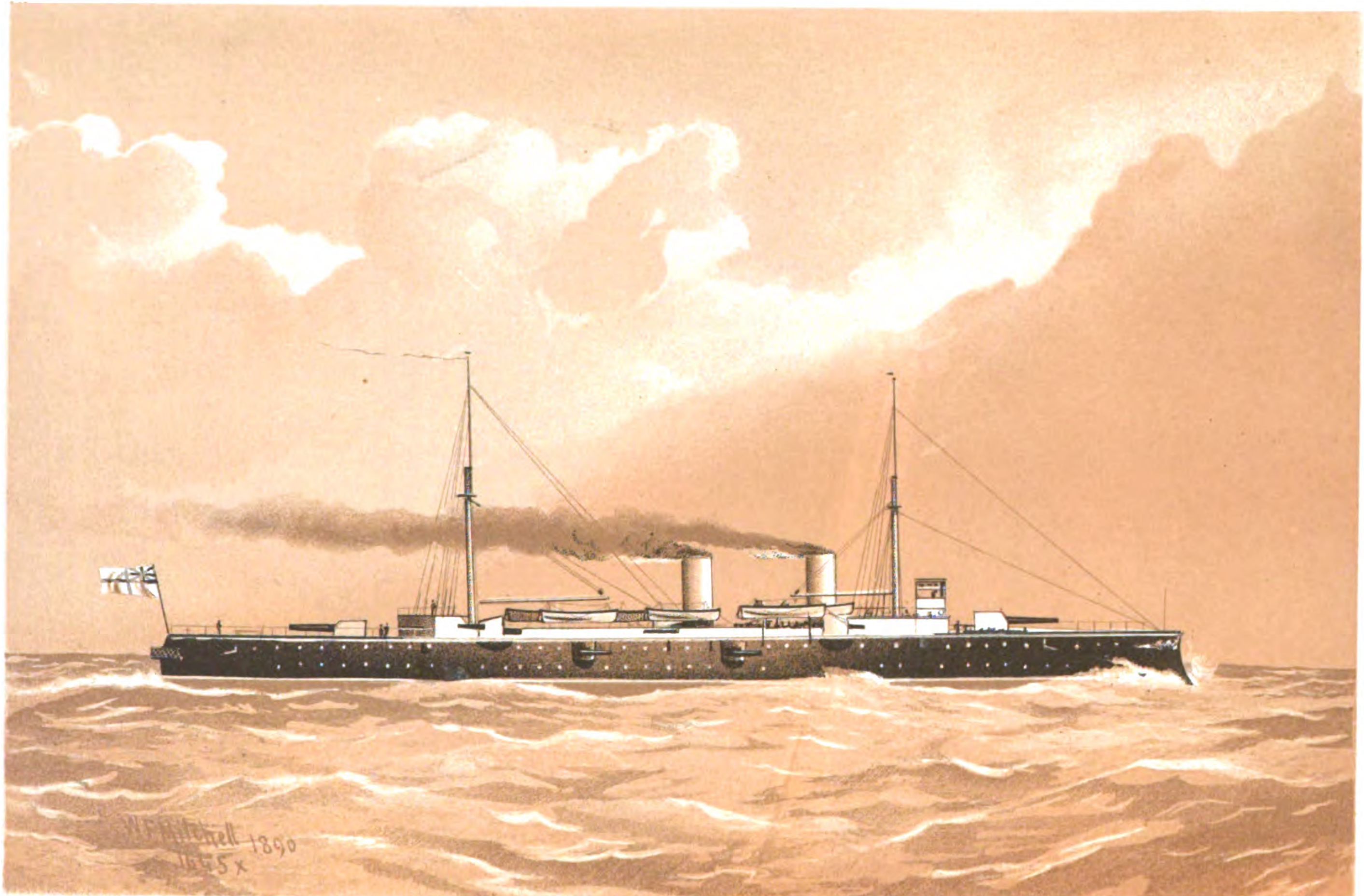

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H. M. S. "BLAKE."

THE

NAVAL ANNUAL,

1890.

EDITED BY

T. A. BRASSEY.

PART I.—Lord Brassey, K.C.B., D.C.L., Commander of the Legion of Honour.

PART II.—F. K. Barnes, Esq., M.I.N.A.

PART III.—Captain Orde Browne, late R.A., Lecturer on Armour to R.A. College.

PART IV.—Statistics, Tables, Official Reports.

"Dir gegenüber steht sie da
Glückseel'ge Insel—Herrscherin der Meere!
* * * *
Wer hat das hohe Kleinod dir errungen,
Das zu der Länder Fürstin dich gemacht?
Hast du nicht selbst, von stolzen Königen gezwungen,
Der Reichsgesesse weisestes erdacht?
Das grosste Blatt, das deine Könige zu Bürgern,
Zu Fürsten deine Bürger macht?
Der Segel stolze Obermacht,
Hast du sie nicht von Millionen Würgern
Erstritten in der Wasserschlacht?"

Schiller, *Die unüberwindliche Flotte.*

1890.

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INTRODUCTION.

In introducing a new volume of the Naval Annual to the public, it is satisfactory to be able to acknowledge the growing interest in the efficiency of the Navy. It is universally and deeply felt that the Fleet, to use the words of Cotton and Payne, is "England's right arm. But for her Fleet, England would be a cipher in the councils of Europe, might be denuded of her Colonies, and could not hold the Indian Empire a year. But for the Fleet, the English working-man might any day find his daily occupation gone, and the price of his children's bread risen to half-a-crown a loaf. The greater the Fleet, and the wider the area of its operations, the more effective this mighty right arm of the nation must become. Every shilling that is devoted to it, if expended with economy and judgment, is well bestowed, for it is England's insurance against those great accidental calamities which destroy the happiness and prosperity, and sometimes the lives of nations."

All Professor Seeley's eloquent arguments for the maintenance of the Army in efficiency may certainly be pleaded for the Navy. From the outset the Navy has been the instrument of British trade. It has sprung into existence with that trade, and has grown with its growth. The Navy has founded the Colonies; and it now protects them. The Navy has been the indispensable agent in establishing this unparalleled world realm.

In considering the position of England as a Naval Power, it is obviously necessary as a measure of self-defence that we should retain the supremacy which was won for us by Nelson and the famous men of days past, when greater opportunities were open to our heroic sailors than have been afforded since.

"Magnanimi heroes, nati melioribus annis."

It is in our commerce only that we are assailable. Both in France and Germany the rights of belligerents have been lately asserted with a ruthless spirit. It is insisted by the new school of naval and military writers that for self-preservation it will be necessary to be first in

making the attack upon the enemy. There should not be the delay of an instant in seeking out his squadrons, forcing them to battle, destroying all his communications by submarine cable and otherwise, and harrying his coasts in such a way as to strike terror into the population, and to prevent to the utmost possible degree the mobilisation of armies. The most important seaport towns should be burnt to the ground. The highway of the sea should be denied to his ships. Commandant Z. refers with approval to a publication by Major von der Goltz, entitled, "The Armed Nation," in which the writer declares that war must be regarded as a duel between nations. It has only one object—to crush the adversary and to render him incapable of continuing to offer resistance.

A similar discussion has taken place with reference to the right to destroy unarmed merchant vessels by torpedoes. Admiral Bourgois has been the exponent of the chivalrous views which he holds to be traditional with the French Navy. In an article published in the *Atlas Coloniale*, Admiral Aube gives the following description of the operations which would be undertaken:—"To-morrow war breaks out, a torpedo-boat has sighted one of these ocean steamers freighted with a cargo of greater value than that of the richest galleons of Spain, the torpedo-boat will follow at a distance, keeping out of sight, and when night comes on will, unobserved, close with the steamer and send to the bottom cargo, crew, and passengers, not only without remorse, but proud of the achievement. In every part of the ocean similar atrocities would be seen. Others may protest; for ourselves we accept in these new methods of destruction the developments of that law of progress in which we have a firm faith, and the final result would be to put an end to war altogether." Admiral Bourgois points out that before making such an attack the nationality of the ship must be verified, and that it is not the custom in an ordinary voyage at sea to display the national flag. The Admiral expresses the conviction that such a proceeding would excite the unanimous condemnation of all civilised people. It is an obvious observation that, if such deeds as those contemplated are done, the stronger combatant will have the power of reprisal and revenge, and could scarcely be expected to have any hesitation in making use of it under the provocation which in the case assumed would have been given. It is well that we are enabled by judicious preparation to make the defence of commerce effective. With a force of cruisers sufficient in numbers, of the right class and type, judiciously distributed, and commanded by vigorous and able officers, we have a greater power of protecting our commerce effectively than in the old sailing days.

In strengthening her Navy, England is pursuing a policy in the strictest sense defensive. We threaten nobody. We cherish no ambitious design. It is more and more the wise policy of England to keep out of engagements in matters in which neither we of the mother country nor our sons in the colonies have any concern. The external policy of England is directed to one object, which is to secure from attack the highway of the sea. The fortification of the coaling stations, the reinforcement of their garrisons, the construction of a fleet to be permanently stationed in Australasian waters, are essential parts of a policy of self-defence.

It has been said that we should not be content with a mere defence of our ocean highways, and that the establishment of a land communication between Russia and China will be a fatal blow to England. It is certain that the means of transport by railway can never compete with the steamship on the long sea route between Europe and China.

In considering the Eastern question in its bearing on British naval power, it is obvious that no new naval resources would be acquired by the advance of Russia to Constantinople. The decayed capital of the Ottoman empire possesses no hardy seamen, no skilled shipbuilders. It has no wealth. It has no supplies of the raw materials for shipbuilding. If it were considered necessary for the maintenance of a naval supremacy, the occupation of Constantinople could be neutralised by the occupation of Gallipoli.

In view of these and other considerations, it is no longer held to be the main aim of British diplomacy to bar the road to Constantinople against Russia. It is admitted that the acquisition of the Turkish capital by Russia would probably be more prejudicial to German than to British interests. It is to be remembered that if ever established at Constantinople, Russia will have placed herself so open to attack by a maritime power, as she never would be at a distance from the sea, in the interior of a large continent. Colonel Maurice, in his introduction to "The Balance of Military Power in Europe," has quoted the following observations from Kinglake:—

"Places where land and sea much intertwine are those where the power of England can best be exerted. . . . The power which we can there exert does not depend on our Navy alone, but upon the marvellous force we possess in our unrivalled Mercantile Marine. There is a quite peculiar and enormously potent military influence which may be exerted by a small army which can be landed at pleasure at unknown points by a nation which possesses the command of the sea."

While England may, under the guidance of a prudent and skilful hand, steer clear of Continental troubles, happily the circumstances of the time give no present indication of war in Europe. The Triple Alliance of the central Powers maintains an even balance in the scale with France and Russia. The equality of the forces which might possibly be in conflict is a guarantee of peace.

Of the new events in naval administration since the last publication of the NAVAL ANNUAL, the great programme of construction undertaken by the United States is the most important. The interests of our country and the great American Republic are so closely bound together that we can be under no apprehension that the new fleet can ever be employed against us.

The compiler feels a recurring sense of regret in contemplation of the hesitating advice and halting opinions expressed in the chapters dealing with the shipbuilding of the future. The problem, for the reasons stated in the text, admits of no definite and final solution. All will agree that the battle-ship should be, like the spear of Minerva, *βριθυ, μεγα, στιβαρον*, heavy, big, sturdy. When we proceed from generalities to particulars, we find no agreement; we reach no absolute truth.

The recently published Memorandum by Lord George Hamilton on the Navy Estimates for 1890-91, does not call for criticism on any essential points. It is a record of much good work for which the country will be grateful. The Admiralty are engaged in carrying into execution the extended programme of shipbuilding, for which the approval of Parliament was obtained in the Session of 1889. The necessity for additional cruisers has been sufficiently urged elsewhere. It may be well to insist once more on the desirability of taking decided steps to bring the older ironclads up to date by the substitution of engines of the most improved types for the obsolete machinery with which they were originally fitted. With more speed and coal endurance these ships will be efficient for many years to come on distant foreign stations.

The removal of masts and yards is passed by without notice in the Memorandum of the First Lord. In the heavy ironclads, such as the Inflexible and the Neptune, and more especially in the case of ships propelled by twin screws, it was well to get rid of top hamper. To deprive cruisers of canvas is a proceeding of doubtful expediency. For ships which may be required to keep the sea for extended periods, to keep station at a great distance from their bases of supply, or to patrol the long trade routes across the Southern Ocean, and these are services which the Navy would certainly be called upon

to undertake in time of war, no means of improving coal endurance should lightly be put aside. In peace, the exercise aloft is conducive to general efficiency.

Lord George Hamilton's observations on ships, machinery, and guns, and on the manning of the Navy will be read with interest and approval.

The Report of the Royal Commission on the Naval and Military Departments has been issued since the body of the NAVAL ANNUAL was placed in the hands of the printer. It will not, therefore, be possible to notice this important paper at length.

The Commission found little to criticise in the administration of the Navy. It is doubtful if the changes which the Commissioners recommend in the constitution of the Board of Admiralty are necessary. The First Sea-Lord has already by tacit consent a commanding position; and it is not desirable to discourage able officers from joining the Board in any position other than that of First Sea-Lord. After some experience of the working of the Board of Admiralty, and of the management of business of magnitude in commerce and in railways, I fail to see any sufficient reason for organic change at the Admiralty. If the individuals filling the several offices and appointments are efficient, there is nothing in the organisation of work, and the distribution of responsibility, under the existing arrangements, which should prevent an able man from doing effective work in the administration of the Navy. Arguing from any experience acquired in the management of a commercial business, it might be difficult to resist the conclusion that the department of the Accountant-General of the Navy is over-manned. It must, however, be accepted that the requirements of the public service, and the supervision of the department by Parliament, entail a mass of work in the keeping of Accounts and Returns for which no analogy would be found in a commercial establishment.

In conclusion, it is a duty to acknowledge once more the sources from which the NAVAL ANNUAL is compiled. All the information it contains was originally published in the *Army and Navy*, *Broad Arrow*, *United Service*, *Engineer and Engineering*, the Army and Navy journal of New York, *Le Yacht*, and the daily newspapers, more especially the *Times*. The compiler is indebted to the faithful band of fellow-workers with whom he has been associated on former occasions. A valuable recruit has been added in Mr. Thomas Allnutt Brassey.

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* By permission of Admiral Sir George Elliot, K.C.B.

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PART I.

CHAPTER I.

THE MANŒUVRES OF 1889.

THE manœuvres and the previous inspection by the German Emperor are important incidents in the history of the British Navy since the publication of the last issue of *The Naval Annual.*

The fleet assembled at Spithead in August, 1889, was certainly the most powerful ever brought together in time of peace. The detail of the ships and the names of the commanders are given in the following Table:—

B FLEET.—Head-quarters, Queenstown and Berehaven. Under the Orders of Vice-Admiral Baird, in command; Rear-Admiral D'Arcy Irvine, C.B., second in command.

Ships.	Classification.	I.HP.	Tons displacement.	Total Complement.	Commanding Officer.
Northumberland . . .	Battleship, 3rd Class	6,560	10,780	711	Capt. S. C. Darwin.
Anson . . .	„ 1st „	11,500	10,600	536	„ B. F. Clark.
Collingwood .	„ 1st „	9,570	9,500	462	„ Harris.
Camperdown .	„ 1st „	11,500	10,600	515	„ R. D. King.
Inflexible . .	„ 1st „	8,010	11,880	463	„ C. C. P. Fitzgerald.
Devastation .	„ 1st „	6,650	9,330	359	„ F. S. Vander-Meulen.
Monarch . .	„ 2nd „	7,840	8,320	577	„ U. C. Singleton.
Iron Duke .	„ 2nd „	3,520	6,010	484	„ R. M. Lloyd.
Hero . . .	„ 2nd „	6,000	6,200	335	„ J. Fellowes, C.B.
Australia . .	Cruiser, 1st Class (belted) . . .	8,500	5,600	450	„ H. H. Boys.
Immortalité .	„ „ „	8,500	5,600	450	„ R. H. Hamond.
Hecla . .	Torpedo depôt ship.	2,260	6,400	272	„ E. J. P. Gallway.
Mersey . .	Cruiser, 2nd Class .	6,000	4,050	321	„ H. Rose.

FLEET B—*continued.*

Ships.	Classification.	I.HP.	Tons displacement.	Total Complement.	Commanding Officer.
Arethusa . .	Cruiser, 2nd Class .	5,500	4,300	297	Capt. G. T. H. Boyes.
Iris . . .	„ 2nd „ .	7,330	3,730	278	„ F. R. Boardman, C.B.
Magicienne .	„ 2nd „ .	9,000	2,950	193	„ J. P. Pipon.
Calypso . .	„ 3rd „ .	3,720	2,770	317	„ Count F. C. Metaxa.
Nymphe . .	Sloop	2,000	1,140	136	Com. C. T. Turner.
Curlew . .	Gun Vessel, 1st Class	1,500	950	102	„ C. J. Norcock.
Grasshopper .	Torpedo Gun Boat, 1st Class . . .	3,000	525	62	Lieut. P. W. Bush.
Rattlesnake .	Torpedo Gun Boat, 1st Class . . .	2,700	550	62	„ T. F. W. Ingram.
No. 25. . .	Torpedo Boat . .	590	..	16	Gunner R. C. Steele.
„ 41. . .	„ „ . .	690	..	16	„ M. J. Ahern.
„ 42. . .	„ „ . .	690	..	16	Lieut. C. R. Keppel.
„ 49. . .	„ „ . .	720	..	16	„ J. F. M. Aynsley.
„ 50. . .	„ „ . .	770	..	16	„ H. L. D. Pearce.
„ 78. . .	„ „ . .	720	..	16	„ S. A. G. Calthorpe.
„ 79. . .	„ „ . .	990	..	16	„ H.R.H. Prince George of Wales.
„ 80. . .	„ „ . .	1,540	..	21	„ C. L. Otley.

A FLEET.—Head-quarters, Milford Haven. Under the orders of Vice-Admiral Sir George Tryon, K.C.B., in command; Rear-Admiral Tracey, second in command.

Hercules . .	Battleship, 2nd Class	6,750	8,680	632	Capt. C. E. Buckle.
Rodney . .	„ 1st „	11,500	10,300	529	„ A. K. Wilson, V.C., C.B.
Neptune . .	„ 1st „	8,000	9,310	541	„ J. F. G. Grant.
Howe . . .	„ 1st „	11,500	10,300	515	„ C. F. Domville, A.D.C.
Ajax . . .	„ 1st „	6,440	8,660	385	„ R. H. Boyle.
Conqueror .	„ 2nd „	6,000	6,200	335	„ H. F. Cleveland.
Invincible. .	„ 2nd „	4,830	6,010	484	„ A. T. Brooke, C.B.
Rupert . .	„ 2nd „	6,000	5,440	242	„ C. B. Theobald.
Black Prince .	„ 3rd „	5,770	9,210	689	„ A. P. M. Lake.
Warspite . .	Cruiser, 1st Class (armoured) . .	10,000	8,400	520	„ H. H. Rawson, C.B.

FLEET A—*continued.*

Ships.	Classification.	I.HP.	Tons displacement.	Total Complement.	Commanding Officer.
Northampton.	Cruiser, 1st Class (armoured) . .	6,070	7,630	568	Capt. A. P. Hastings, C.B.
Shannon . .	„ „	3,370	5,390	452	„ A. E. Dupuis.
Undaunted .	Cruiser, 1st Class (belted) . . .	8,500	5,600	450	„ M. J. Dunlop.
Narcissus . .	„ „	8,500	5,600	450	„ G. H. U. Noel.
Galatea . .	„ „	8,500	5,600	450	„ A. C. H. Paget.
Aurora. . .	„ „	8,500	5,600	450	„ T. S. Jackson.
Thames . .	Cruiser, 2nd Class .	5,700	4,050	324	„ J. C. Burnell.
Forth . . .	„ 2nd „	5,700	4,050	324	„ S. C. Holland.
Mercury . .	„ 2nd „	7,290	3,730	278	„ C. Johnstone.
Medea . . .	„ 2nd „	9,000	2,800	193	„ A. W. Moore.
Melpomene .	„ 2nd „	9,000	2,950	193	„ J. R. E. Pattisson.
Marathon . .	„ 2nd „	9,000	2,950	193	„ J. G. Jones.
Serpent . .	„ 3rd „	4,500	1,770	159	Com. F. Powell.
Mohawk . .	„ 3rd „	3,500	1,770	159	„ R. F. O. Foote.
Sandfly . .	Torpedo Gun Boat 1st Class . . .	3,000	525	62	„ F. T. Hamilton.
Spider . . .	„ „	3,000	525	62	„ D. A. Gamble.
No. 57. . .	Torpedo Boat . .	740	..	16	„ H. Orpen.
„ 58. . .	„ „ . .	720	..	16	„ C. E. E. Carey.
„ 59. . .	„ „ . .	750	..	16	„ R. K. Arbuthnot.
„ 60. . .	„ „ . .	740	..	16	„ D. R. de Chair.
„ 66. . .	„ „ . .	630	..	16	„ S. R. Fremantle.
„ 71. . .	„ „ . .	650	..	16	„ P. V. Lewes.
„ 75. . .	„ „ . .	680	..	16	„ H. Jones.
„ 76. . .	„ „ . .	730	..	16	„ W. O. Boothby.
„ 77. . .	„ „ . .	660	..	16	„ E. F. B. Charlton.
„ 81. . .	„ „ . .	1,330	..	26	„ H. B. Jackson.

C SQUADRON.—Head-quarters, Lamlash Bay. Under the orders of Rear-Admiral Commanding A Fleet.

Hotspur . .	Battleship, 2nd Class	3,060	4,010	232	Capt. T. H. Boyse.
Belleisle . .	„ 2nd „	3,200	4,870	286	„ the Hon. H. R. Hare.
Gorgon . .	Armoured Coast Defence Ship . .	1,670	3,560	191	„ A. D. Fanshawe.
Cyclops . .	„ „ . .	1,680	3,560	191	Com. A. M. Gardiner.

C SQUADRON—*continued.*

Ships.	Classification.	I.HP.	Tons displacement.	Total Complement.	Commanding Officer.
Hecate . .	Armoured Coast Defence Ships . . .	1,750	3,560	191	„ B.R. Bradford.
Hearty . .	Special Service Vessel	1,800	1,300	87	„ W. Wilson.
Plover . .	Gun Boat 1st Class	1,200	755	75	Lieut. E. R. Rason.
No. 51 . .	Torpedo Boat . .	680	..	16	„ F. K. C. Gibbons.
„ 52 . .	„ „ . .	720	..	16	„ J. C. Tancred.
„ 53 . .	„ „ . .	760	..	16	„ E. J. W. Slade.
„ 54 . .	„ „ . .	720	..	16	„ Hon. P. M. Hely-Hutchinson.

D SQUADRON.—Head-quarters, Plymouth. Under the orders of Commander-in-Chief, Plymouth.

Inconstant .	Cruiser, 2nd Class .	7,360	5,780	608	Capt. J. B. Warren.
Prince Albert.	Armoured Coast Defence Ship . .	2,130	3,880	199	Com. Hon. E. T. Needham.
Racoon . .	Cruiser, 3rd Class .	4,500	1,770	159	„ G. F. King-Hall.
No. 2 . . .	Torpedo Boat . .	400	..	11	Gunner R. S. C. Staddon.
„ 23 . . .	„ „ . .	700	..	14	„ E. Walker.
„ 24 . . .	„ „ . .	730	..	14	„ W. J. Thompson.
„ 34 . . .	„ „ . .	1,000	..	16	„ W. E. Pauley
„ 45 . . .	„ „ . .	690	..	16	Lieut. E. A. Salway.
„ 55 . . .	„ „ . .	660	..	16	„ Hon. S. C. J. Colville.

E SQUADRON.—Head-quarters, The Downs. Under the orders of Commander-in-Chief, Sheerness.

Glatton . .	Armoured Coast Defence Ship . .	2,870	4,910	190	Capt. J. E. Stokes.
Volage . .	Cruiser, 2nd Class .	4,530	3,080	355	„ W. A. D. Acland.
Hydra . . .	Armoured Coast Defence Ship . .	1,470	3,560	191	Com. G. L. Poë.
Trent . . .	Gun Boat, 3rd Class	380	363	51	Lieut. G. Richards.
Slaney . .	„ „ 3rd „	370	363	51	„ H. D. Law.
Medway . .	Gun Boat, 3rd Class	310	368	51	„ J. Masterman.
No. 4 . .	Torpedo Boat . .	350	..	11	Gunner J. Courtnell.
„ 12 . .	„ „ . .	440	..	11	Boatsn. W. L. Hackney.

E SQUADRON—*continued.*

Ships.	Classification.	I.H.P.	Tons displacement.	Total Complement.	Commanding Officer.
No. 63 . .	Torpedo Boat . .	700	..	16	Boatsn. J. Sanders.
„ 64 . .	„ „ . .	670	..	16	Lieut. A. H. Limpus.
„ 65 . .	„ „ . .	640	..	16	„ A. D. Douglas Hamilton.
„ 72 . .	„ „ . .	670	..	16	„ F.C.D.Sturdee.

F SQUADRON.—Head-quarters, Hull. Under the orders of Commodore Markham, Commanding G Squadron at Leith.

Ruby . . .	Cruiser, 3rd Class .	1,830	2,120	262	Capt. R. F. H. Henderson.
Tartar . .	„ 3rd „ .	3,500	1,770	159	Com. G.N.A.Pollard.
Traveller . .	Tender	1,120	700	23	Lieut. Drury.
Medina . .	Gun Boat, 3rd Class	310	363	51	„ H. K. Gregson.
No. 67 . .	Torpedo Boat . .	660	..	16	„ E. C. Hogg.
„ 68 . .	„ „ . .	650	..	16	„ C.W.M.Plenderleath.

G SQUADRON.—Head-quarters, Leith. Under the orders of Commodore Markham.

Active . .	Cruiser, 2nd Class .	4,130	3,080	356	Com. A. H. Markham.
Medusa . .	„ 2nd „ .	9,000	2,800	193	Capt. E. H. M. Davis.
Pigmy . .	Gun Boat, 1st Class	1,200	755	75	Lieut. G. H. Hewett.
Watchful . .	„ „ 2nd „	650	560	55	„ A. Furlunger.
Spey . . .	„ „ 3rd „	410	363	51	„ C. F. Foley.
Tees . . .	„ „ 3rd „	320	363	51	„ J. W. Brown.
No. 73. . .	Torpedo Boat . .	960	..	16	„ H.H.Campbell.
„ 74. . .	„ „ . .	700	..	16	„ R. Hudleston.

Arrival of the German Emperor.

The German Emperor arrived at Spithead on the 2nd of August under most favourable conditions of weather. His yacht, the Hohenzollern, was escorted by the ironclads, Friedrich der Grosse, Preussen, Deutschland, Kaiser, Sachsen, Baden, and Oldenburg, the corvette, Irene, and the despatch vessels, Zieten and Wacht. The German squadron passed through the English fleet in admirable order; the decks, manned with seamen and marines, presenting one of the most brilliant and imposing spectacles ever witnessed in waters which have often been the scene of similar displays.

During his stay in England the German Emperor exhibited the

deepest interest in our Navy, embracing every opportunity of showing his cordial feeling towards the service which is the pride and strength of England.

The inspection of the fleet took place on the 5th of August. The close of the ceremony of inspection was described as follows by a correspondent of the *Times*:—

The Inspection by the German Emperor.

"The Emperor carried out to the letter the programme which had been arranged for him. The first ships the Emperor saw were the Spider and Sandfly, long and low torpedo gunboats of the first class, built so recently as 1888 at a cost of little short of £50,000 apiece. Then came the Mohawk, a third-class cruiser, built at Glasgow and finished in 1887; then the Serpent, another third-class cruiser; then the Medea, a second-class cruiser, recently completed. The Medea marked the beginning of a double line. On the port side were the Watchful, Tees, Spey, Pigmy, Medusa, and Active; the first five being close together and the Active stationed some little way from them. On the starboard side were the Marathon, the Melpomene, and Mercury, the Mercury being as near as possible to the Active. Then, on the port side, came the Medina, the Elk, the Tartar, and the Ruby; opposite to them being the Thames, the Forth, and the Aurora, on the starboard side. Next were the Medway, Slaney, Trent, and Hydra, being close together, and the Glatton and the Volage opposite them. Stationed at regular intervals and in the most precise line possible, a statement which applies to the whole of the two great squadrons, were the Narcissus, Galatea, Undaunted, and Rupert. Then on the port side was stationed the D squadron, comprising the Prince Albert, the Racoon, and the Inconstant, which among many ships smartly manned and gaily dressed looked extremely well. Opposite them were the flagship, the Howe, the Shannon, and the Conqueror; next on the port side came the C squadron, consisting of the Plover, painted white for Eastern service, the Hearty, Hecate, Gorgon, Cyclops, Hotspur, and Belleisle, from the last of which came a particularly hearty cheer. Opposite them were the Warspite, the Hercules, the Black Prince, the Northumberland, the Invincible, the Ajax, the Neptune, and the Rodney. Between the C squadron and the mainland lay the torpedo flotilla in two divisions. The eastern end of the line reached as nearly as possible to the outer spit, and the German Emperor might well have supposed after he had passed down this long avenue of war vessels of every description that his labour, even though it was a labour of love, had almost come to an end. But it was not so. The favoured vessels, turning their heads to the westward in full view of the Sunbeam, which was anchored

in the open water so as to command a clear view up the lines of the assembled fleet, had to enter another line, passing the vessels of the A squadron from the Rodney to the Howe on the right-hand side and another line of vessels on the left. Those on the left were the Anson (flying the flag of Rear-Admiral H. G. d'Arcy Irvine, C.B.), the Collingwood, and the Inflexible. Then came the Monarch, the Iron Duke, the Northumberland (flying the flag of Vice-Admiral J. K. E. Baird), the Camperdown, the Devastation, the Hero, the Immortalité, the Australia, and the Calypso. This brought the Emperor, after his tour among the grim and frowning vessels, to the Commander-in-Chief's flagship, the Howe, where a ceremony was appointed to take place, and where the presence of a number of steam pinnaces shortly indicated that this part of the programme was not going to be omitted.

"The Victoria and Albert anchored abreast of the Howe, on board of which were assembled, in full dress, all the Admiralty and the officers in command above the rank of lieutenant, awaiting an order to go on board the Royal yacht to be presented to the German Emperor. So on board the Royal yacht, within the waters of the port, and in full view of the most majestic and powerful fleet which has ever been collected in English waters, the young Emperor of Germany graciously received the men who command the vessels assembled. It was a memorable scene; it was one which will not readily be forgotten. It was one which may not improbably make its mark in history; for it was no light thing that the Sovereign who commanded the most powerful army in the world should have seen with his own eyes, displayed in friendly array, the fleet which, in spite of all that is said by cynical critics, in spite of occasional failures of guns or machinery, and in spite of unhappy prophecies of failure which will occur from time to time, is beyond all doubt the finest fleet in the world."

Reception by the German Emperor of the officers in command of the ships assembled.

Early on the 6th of August the British Fleet proceeded to sea. The weather was boisterous, and, owing probably to want of practice, difficulty was experienced on board some of the ships in clearing their cables.

The Fleet proceeds to sea.

The following graphic description of the fleet weighing anchor, and subsequently steaming past the German Emperor on board the Osborne in Sandown Bay is taken from the *Standard*, August 8th:—

"It was at half-past three yesterday morning that the fleet began to unmoor, preparatory to proceeding to sea; but it was not until nearly eleven that Sir George Tryon was able to give the signal

Sir George Tryon.

Delay in weighing.

for his squadron to weigh anchor. Nearly all the delay was caused by trouble and mishaps connected with the anchor gear of various ships. There is no part of the equipment of a man-of-war which requires more management and experience in handling than the ground-tackle. Every vessel has peculiarities of her own in this respect. Therefore, it is due probably to the crews being, in most cases, quite strange to their ships, and to the officers not yet having got the hang of things, that so many shortcomings were made apparent. Soon after ten o'clock, Admiral Baird got impatient of further delay; for it was manifest that if he did not start speedily another review might have to be postponed. So he signalled the ships of his squadron to proceed to sea as soon as ready; and shortly afterwards they began filing out to the eastward in a long single line. But some ships could not obey the order; and amongst these were the Anson, Collingwood, and Inflexible, still engaged in getting up their anchors. However, as soon as the tail-end of Admiral Baird's force moved off the ground up went the signal in the Hercules for the A squadron to follow suit, the flagship to lead, and each of the other vessels to take up her proper station astern. All this time it was blowing stiff from the westward, with a nasty lop on. At a little after eleven, the flagship drew ahead, and turning to the eastward, so as to bring Southsea on our left and the Isle of Wight on our right, stood on under easy steam for the other ships to follow.

Admiral Baird's squadron.

The A squadron with Hercules leading.

"Far away ahead of us, as we once more turned to the southward, after skirting the shoals off St. Helens, we could see anchored close in under the shore of the Isle of Wight, exactly opposite the pretty little village of Sandown, the three Government yachts, and standing down towards them Baird's squadron in long single file. The flagship led, and the ships covered a space fully four miles in length. About two miles from the sternmost ship of his squadron, the Hercules led the A squadron on the same tack. Each vessel was supposed to be ten cables, or 400 yards, astern of the one immediately in front, and to follow the same course in line with the leader. It was not an easy task to do this with some of the ships. The erratic Ajax, for example, would dart out of the line at times, making a wide sweep, and, as she plunged into the seas, would send the spray flying in showers hundreds of feet high, while great seas swept her forward deck. There was a stiffish breeze blowing and plenty of sea on, and the cruisers cut through it as a knife would cut butter. The armourclads, and especially those of the Admiral class, set up a great smother under their bows, and thumped the water as if to pummel the life out of it. All our laggards had now come up to the Black

Prince, and the Northampton last, with the Galatea flying through the water like a racehorse, to get into her allotted station astern. The big curve we had made to the eastward enabled them to get up. All our brood now safely astern and beautifully in line, so much so that when we made a signal each ship had to repeat it before the rest could take in its import.

"It is just three o'clock as we turn round between the Fire Queen and the shore. The bugle sounds, officers and men hurry on deck, the seamen man the rigging, blue-jackets swarm into the shrouds, arraying themselves in broad bands of blue and white, with smart precision. We can see Sir Edmund Commerell on the deck of his little ship, and he sends out a signal of commendation to our Admiral, 'Your line looks very well indeed.' It certainly does look perfect. The space between the ships is kept with wonderful precision, and no regiments ever swung past a saluting post maintaining better distance. Now we race by the Enchantress, with the Lords of the Admiralty on board, and proud and satisfied they well might be with the show to-day. Then, as we come in line with the Osborne, we can see the Emperor, in his English naval uniform, on the bridge. Out rolls our salute. As he raises his undress cap, we pass within a hundred yards or so of the yacht, the guns roaring, and the men cheering as we hurry by. Two-and-twenty war vessels have passed by ahead of us, two-and-twenty are following astern, and from end to end the string of ships covers nearly twelve miles. After us comes the Shannon, and she rips out her salute as her bow comes abreast of the yacht's bridge; then the old Ajax, acquitting herself well for once in a way. Behind her are the Rodney and the Howe, the one only distinguishable from the other by Admiral Tracey's flag. The Conqueror, Warspite, and Neptune follow on, and complete the battle-ships. At this point the symmetry of the line is broken for a few moments by a painful incident. A poor fellow has fallen overboard from the Narcissus, and, as we subsequently learn, sank like a stone just opposite the Royal party. The boats pull about to look for him, but without success. Aurora, Forth, Thames, Mercury, Melpomene, Marathon, Medea, Spider, and then the three loiterers, Galatea, Northampton, and Black Prince follow on as the parade continues, and it is past four o'clock when the last one rounds the firing point, and the yachts stand back into the harbour.

The Fleet passing the Emperor.

"A grander, a more magnificent demonstration of England's fleet it would, indeed, be difficult to imagine. I have seen many Naval reviews, but none before to compare with this."

These splendid pageants over, the commanders of the fleets

addressed themselves to more serious business. According to the memorandum issued for the guidance of the Admirals commanding (we quote from the *Edinburgh Review* of January, 1890), the general idea of the manœuvres was that "A strong maritime power, with whom hostilities are considered to be imminent, prepares a fleet in two of its principal naval ports. A British force of superior strength is stationed in what are considered to be the most suitable strategical positions for masking the enemy's ports in which his forces are assembled, and in addition small squadrons are placed in the most suitable positions on the coast for the purpose of patrolling and affording protection against the attack of cruisers. The Admiral in command of the British Fleet is, on war being declared, left an entirely free hand with regard to the disposal of the force under his orders. It is to be utilised according to the best of his judgment, for:—I. The attack on the fleet of the enemy or any part of his forces should they leave their fortified forts. II. The protection of the coasts of Great Britain. III. The protection of British commerce in the Channel and its vicinity. Ireland is to represent the country of the enemy, and Great Britain British territory."

General idea of the Manœuvres.

Position of the Fleets when war was declared on 15th of August.

When war was declared on the 15th of August, Admiral Tryon's force was at Milford Haven; while the main body of Admiral Baird's fleet was at Queenstown, with a few ships at Berehaven. Admiral Tryon commenced operations with an attack in the Irish Channel. His four first-class cruisers, the Undaunted, the Narcissus, the Galatea, and the Aurora, steered for Queenstown; the Mercury with five torpedo boats was despatched to Kingstown; the Warspite, with the Serpent, the Mohawk, the Sandfly, and five torpedo boats steered for Waterford; the Hotspur, the Belleisle, the Hearty, and four torpedo boats proceeded to Belfast. The three flotillas were instructed to do as much destruction as they could in the seaports against which they were despatched.

We will now turn to the official narrative.

First' series of main operations.

"Both the main fleets, A and B, proceeded to sea as soon as 'hostilities' began. Some portions of the former and C Squadron were employed in the previously-mentioned movements against the Irish ports. A's belted cruisers, Undaunted, Narcissus, Galatea, and Aurora, reconnoitred Queenstown and Berehaven, and learned, at the former place from a fishing-boat, at the latter from observation, that B Fleet was no longer in either port. The Forth and Thames were sent to a selected position in order to impede the attempts of the 'enemy's' cruisers to injure British commerce, a duty which, as above stated, the belted cruisers were also to undertake. Vice-Admiral

Sir George Tryon, with the Rear-Admiral and the rest of the A Fleet, repaired to positions on previously arranged lines of observation taken up with a view of guarding the British seas. It was intended that the ships should arrive independently, but owing to a dense fog, which detained some of them, all, including those which had proceeded to Waterford, reached their appointed stations at the same time. D Squadron, under the orders of the Commander-in-Chief at Devonport, with whom the Admiral of the A Fleet had opened communications, also shared in the work of guarding the Channel on another line.

Admiral Baird on leaving Queenstown.

"Vice-Admiral Baird on leaving Queenstown was accompanied by the—

Northumberland (flag).	Iris.
Camperdown.	Mersey.
Iron Duke.	Magicienne.
Hero.	Hecla.
Inflexible.	Curlew.
Immortalité.	Rattlesnake.

and torpedo boats, 80, 78, 50, 49, 41, and 25.

"Two torpedo boats, 42 and 79, were ordered to proceed by the east coast to Lough Swilly, for which place the Inflexible, Hecla, and Grasshopper, as mentioned above, and the other torpedo boats were also directed to make.

"During the 15th of August, the first day of the manœuvres, the weather off the south-west coast of Ireland had been thick. In the evening it cleared, and the Vice-Admiral was joined by the Second Division of his Fleet under the Rear-Admiral, who had left Berehaven in the morning, at a rendezvous 30 miles S.W. of Galley Head. The Arethusa and Calypso were sent to cruise for merchant ships off Ushant. For a like purpose the Mersey, Iris, and Magicienne were directed to cruise off the south-west and north-west coasts of Ireland. Some changes in the cruising arrangements, which will be noticed in due course, were made later. At 6.40 P.M. Rear-Admiral D'Arcy-Irvine was detached with the force enumerated below :—

B's attempt on the English Channel.

First Division.	Second Division.
Anson (flag).	Camperdown.
Collingwood.	Hero.
Australia	Immortalité.

"He was to endeavour to carry out attacks on the Downs, the Thames, and the east coast of Great Britain; after which, going north about, he was to rendezvous at Lough Swilly, where, as

already intimated, a defended base had been formed. A collier for the service of the ships on the return voyage was sent to the Orkneys. The presence of this collier in Long Hope, in the Orkneys, became known later to the Coast Guard, by whom it was reported by telegraph to the Admiralty. Intimation that an attempt to capture the collier should be made was sent thence to the cruiser Medusa, which ship eventually effected her capture.

Plan of operations of Rear-Admiral D'Arcy Irvine.

"The plan of operations which the Rear-Admiral of the B Fleet was directed to execute had been explained with minuteness in a written memorandum drawn up for the guidance of the commanding officers of the faster armour-clads and belted cruisers, which only had been selected for the expedition. Each division steered till dark a misleading course, the first division making for a point some 20 miles to the southward and westward of the Fastnet, and the second for a point about 12 miles south of Galley Head. From these points the ships were to follow individual tracks, which had been precisely laid down on a specially prepared chart, at pre-arranged speeds. It was intended that they should reassemble at a rendezvous south of Beachy Head, and thence go on to make the attacks already spoken of.

The first conflict.

"The first conflict between the ships of the contending fleets took place on the morning of Saturday, the 17th August. Between 5 and 6 o'clock the Camperdown sighted and subsequently engaged an A cruiser, which proved to be the Thames. The barbette-ship claimed to have put the cruiser out of action, but in the final adjudication on claims this contention was not considered to be established. Rear-Admiral Tracey, second in command of the A Fleet, in the Rodney, sighted the 'enemy's' ship Hero at 6.45 A.M., and started in pursuit at full speed, together with the Howe, Conqueror, and Neptune, being afterwards joined by the Thames. At 7.30 the Rear-Admiral made out the Camperdown and Immortalité of the 'enemy,' and about three-quarters of an hour later the Warspite and Melpomene of his own side in chase. At the time of being seen from the Rodney the Camperdown observed her two friends, Hero and Immortalité, standing towards her and signalling that they had been chased by some of A's heavy ships and the Warspite. The three B ships, Camperdown, from which the 'British' had now been sighted, Hero and Immortalité, altered course to the westward, proceeding at a speed adapted to that which the Hero, the slowest, was able to keep up. The A ships continued to follow. At 10.30 A.M., being within engaging distance, fire was opened by the Camperdown and Hero, and shortly after-

wards replied to by their opponents. Rear-Admiral Tracey, having ascertained the strength of the 'enemy's' force, sent back the Neptune and Conqueror to rejoin the Commanding Admiral's flag. The Rodney and Howe then engaged the Hero, whilst the Warspite was ordered to turn her attention to the Immortalité, which was steering to the southward. About noon the Camperdown manœuvred to assist the Hero, much pressed by the two barbette-ships, and by so doing greatly diminished her distance from the latter. At 12.50 P.M. the Rear-Admiral, having appealed to the umpire present, decided that the Camperdown and Hero had been 'captured.' At the final adjudication the claim as against the Camperdown was not substantiated, though it was as against the Hero, and also as against the Immortalité, which had been overtaken and engaged by the Warspite. That the force with which the Camperdown and her consorts were engaged had gained the advantage, as anticipated by the rules, was not disputed.

"In the meantime, the B ships of the other division had also come in contact with those of A. At half-past six in the morning of the same day, the 17th, Rear-Admiral D'Arcy-Irvine, in the Anson, whilst standing to the eastward, sighted five ships of the other side 10 miles off to the S.E. At first the Rear-Admiral shaped course so as to pass between the strangers and the Lizard, but, fearing that he might be perceived from the signal station and his movements be telegraphed all over the coast, he decided to run back along the track and pick up some of his own ships. The Collingwood was soon sighted and directed to stand to the northward and try to pick up friends, whilst the Anson with the same object stood to the S.W. The Hero was next observed being chased, and stretching across the Anson's track were discerned the Hercules, Rodney, Howe, Ajax, Neptune, Conqueror, Warspite, Black Prince, Invincible, Shannon, Northampton, two belted cruisers, and one cruiser of 'M' class. In fact, the greater part of the 'British' fleet had been fallen in with. At 7.40 A.M. Vice-Admiral Sir George Tryon, in the Hercules, had learned from the Warspite and from distant signals of the presence of the 'enemy' in his neighbourhood. Being of opinion that the latter was likely to be in force, the Vice-Admiral determined to keep both divisions, his own and the Rear-Admiral's, in touch. With the former he steered so as to cut off the 'enemy,' if he stood to the westward. After some alterations of course, finding that the 'British' were coming up fast, the Anson was put on a N.W. course at full speed to try and draw the A ships off the French coast, in the hope, if they could be shaken off, that it would still

Rear-Admiral D'Arcy-Irvine.

Sir George Tryon.

be found possible to get round them by Ushant and pass up the Channel in the night. This was frustrated by the 'British,' who pressed the Anson and her friends with a force estimated by Rear-Admiral D'Arcy-Irvine at eight or ten battle-ships and a cruiser. Sir George Tryon and the division with his flag had shaped a course which, while it maintained the bearing from the 'enemy,' converged on his until the two sides had closed to within 6 or 7 miles of each other. The Vice-Admiral's division, now strengthened by the junction of the Neptune and Conqueror, continued in pursuit of the B division, still remaining complete. Having chased it for 97 miles to lat. 49° 30′ N. and long. 7° 12′ W., and finding that he could not overtake them, and it being clear that the 'enemy's' ships could not interfere with Rear-Admiral Tracey's division, Sir George Tryon ordered his ships to return to their assigned stations. The chase had continued throughout the afternoon, and at 6 P.M. the Australia, having been directed to keep a watch on their opponents, the Anson and Collingwood returned towards Cape Clear."

The views of M. Weyl.

It is not within the competence of a civilian to offer an opinion on the strategy of able and experienced Admirals; it is certain that Admiral Baird was unfortunate. Monsieur Weyl, the well-known French naval writer, remarks that Admiral Tryon was a lucky man, that fortune had served him well, and he had known how to make use of his opportunities; but in the case of actual war it must not be supposed that in the winter season, with heavy weather and dark nights, it would be difficult for a well-disciplined and well-commanded squadron to break through a line of ships occupying the positions held by those of Admiral Tryon's squadron.

Reviewing what occurred with the easy wisdom which comes after the event, it is obvious that Admiral Baird might have had a better chance of success, if on the declaration of hostilities he had steered to the north-west for a few days, out of the track of ships, and had then re-curved upon England and made a simultaneous attack with small but compact squadrons on the English and Irish Channels and on the east coast. We return to the official narrative.

Admiral Baird's arrival at Queenstown.

"At 4.30 P.M. on the 18th August the Anson and Collingwood arrived at Queenstown. They were joined there by Vice-Admiral Baird in person and the Division with his flag early the next morning. Whilst the attempt to pass up the English Channel was being made by the detachment of the B Fleet under the Rear-Admiral, the Vice-Admiral had been cruising to the southward of Ireland. On reaching Queenstown he learnt the result of the engagements at the mouth of the Channel, and on the same day gave

directions for the carrying out of the Second Series of main operations. Though the ships selected to take part in these left Queenstown before the day was over, it will be more convenient to postpone the account of their proceedings until that of the movements of the cruisers employed in assailing and in defending sea-borne commerce has been given.

Cruiser operations.

"It has been already said that several of B's cruisers were despatched on the first day of 'hostilities' to cruise with the object of intercepting merchant-shipping, the Arethusa and Calypso in the neighbourhood of Ushant, and the Mersey, Iris, and Magicienne off the south-west and north-west coasts of Ireland. Subsequently the Mersey was sent to cruise off Ushant and the Australia acted in concert with the Iris and Magicienne. The Calypso, as before observed, eventually took up the work of completing the defences at Berehaven in conjunction with the Nymphe. On the 23rd August the Grasshopper, and on the 25th the Hecla, left Lough Swilly to look out for the merchant ships of the other side, and on the 27th the Rattlesnake left port with the same object. The work of attacking commerce was not carried on undisturbed. On the night of the 16th–17th August the Calypso was chased by the A cruisers Thames and Forth. Under steam alone, against the wind, the Calypso made 11·8 knots an hour. A sudden alteration of course of 9 points enabled her to make plain sail, less royals. Under steam and sail she went away at the rate of 15 knots, and, favoured by misty weather, escaped from her pursuers. She anchored at Berehaven at 3 A.M. on the 23rd. Also on the night of the 16th–17th the Arethusa fell in with the two 'hostile' cruisers and was chased by them for several hours, when, the weather becoming thick, she lost sight of them. On the 19th she was compelled to give up an attempt to capture a steamer, which still required half-an-hour for its completion, by the appearance of a steamer of the Racoon class and one of the Forth class, by which she was again chased. The Arethusa returned to Berehaven on the 23rd and left again for further cruising the same day. On the 20th the Mersey sighted and gave chase to a cruiser of the Serpent class, but falling in with the consort of the latter had to alter course to the S.W. She lost sight of both vessels at 10.30 P.M.

Chase of Arethusa.

"During her second cruise the Arethusa on several occasions encountered ships of the other side. On the 25th she was chased. On the morning of the next day she was again chased by a superior force. At 6.30 A.M. on the 27th August, in lat. 48° 16′ N., long.

6° W., Ushant Lighthouse E. ¼ S. 37 miles, the Arethusa sighted a cruiser of A's of the Thames class. Not long afterwards two more cruisers of the same side were observed, one being subsequently made out to be belted. Between 9 and 10 A.M. the friendly Mersey was seen, and the two ships remained in each other's neighbourhood throughout the day, steaming away from their pursuers, one of which proved to be the Warspite. At 8.37 P.M., according to the Arethusa's report, the chase, which had been reckoned as having lasted fourteen hours, over a distance of 215 miles, terminated. The pursuing ships desisted when the time appeared to have arrived for claiming the 'capture' of the Arethusa, and the severe 'crippling' if not capture of the Mersey. These claims were submitted at the final adjudication at Devonport. The decision, however, was against them, being to the effect that neither ship was captured nor sunk, but that both had been driven off their cruising ground.

"The amount of activity displayed by B's fast cruisers will be most easily estimated if the general result of their cruises be stated. Six of these ships claimed to have 'captured' ninety-five merchant vessels, or a total of 162,730 tons. It may be observed that the merchant vessels did not consider themselves to be engaged in the manœuvres, and therefore made few if any efforts to escape capture, or even to alter course so as to avoid approaching an 'enemy's' cruiser."

Capture of merchant ships.

Admiral Baird's operations.

The 17th of August, so disastrous in its results to Admiral Baird, decided the fate of the mimic war. Admiral Baird's further proceedings are described in the same general order from which we have already quoted: "I arrived on the 19th with the Northumberland, Monarch, Devastation, and Iron Duke, and received the Rear-Admiral's report. There was nothing now to be done but to send the ships round by the north to inflict damage on the east coast, and that evening the Anson and Collingwood proceeded on this service. I did not send the Australia with them, she having a small defect at that time, and I required her for other service.

"Finding Lough Swilly under the altered conditions too distant a base for torpedo boats to work from, I sent them independently down the east coast of Ireland for service there. At the same time the Inflexible proceeded to the North Sea to assist in damaging commerce and ports on the east coast, and the Hecla put to sea to cruise and capture ocean steamers in their tracks across the Atlantic. The Inflexible met and joined Admiral D'Arcy-Irvine off Wick on the 26th, thereby combining a very powerful force."

For a description of the incidents which occurred during the cruise

of the squadron acting under the command of Admiral D'Arcy Irvine we turn to the correspondent of the *Standard*, who was on board Her Majesty's ship Collingwood.

The *Standard* account of doings of Admiral D'Arcy Irvine in the North Sea.

"We have now been five days at sea since quitting Ireland, and neither foe nor friend have we heard or seen. The course we have taken might, for all signs of humanity that we have come across, have been over some silent and unknown sea, upon which no wanderer had ever before passed. Once only we saw in the far distance the white sails of a barque, but beyond that nothing but the restless sea and lowering skies have been our companions.

"Our course has been as follows:—When quietly at night and with great dread that even with all our precautions we might yet find ourselves blockaded by the enemy the Anson and the Collingwood stole out of Queenstown Harbour, we shaped our course out into the Atlantic, and then, when sufficiently at sea, headed as due north as the compass pointed, and thus it was that for three days we went along, always on the watch for the enemy, of whom we had heard the most appalling rumours, and always wondering if our few ships were the last left uncaptured, if we were to remain so or not, or, getting some good chance, aided by astute and skilled seamanship, it was to be our fate eventually to return to Portsmouth the sole remaining vessels that had escaped the disaster of the huge fleet that sailed out of Spithead. As hour after hour passed, we rejoiced that, for the time being at least, we were safe, and as day followed day we began to experience some of those disadvantages which pertain particularly to the stormy North. On the third night we saw on our lee quarter the small ridge of rocks which bears the name of the Island of St. Kilda, and lies the most westerly of the Hebrides, and on the next morning two more rocks, for they are nothing else, which form the northern portion of the group, and here it was that the sea was most merciless to us. The strong south-westerly wind had by now freshened into a gale, and with this gale came huge seas that not only washed our quarter-deck and our whole ship from stem to stern, but even rose to our spar decks and drenched our bridges. Deluges of water poured in upon us, swamping our wardroom and all our cabins, so that our slumbers were accompanied by the swish-swish of the water rolling backwards and forwards beneath our very berths, and by the general crash of the tables, crockery, and everything else that was movable. That the Collingwood was a sea boat, although a roller, is not to be denied, and the way in which she defiantly hurled the waves back from her was a sight to see; but that she is a dry or water-tight vessel cannot be asserted. At this time our torpedo booms performed their share in

Torpedo booms smashed. the general melée by smashing up one after the other, and they split like matches. As these booms are stout Norwegian pine, clamped and bound with iron, and are 3 feet in circumference and 30 feet in length, some idea may be gained of the force of the waves to which they were subjected. At any rate, by Friday morning the whole of the weather-side booms had gone, and as the ship was now altering her course it was the turn of those which had been on the lee side to begin. That course now lay due south, we in the night having passed between the Orkney and Shetland group, and near to Fair Isle."

Capture of east coast towns. Proceeding down the east coast of Scotland, Admiral D'Arcy Irvine in the Anson, accompanied by the Collingwood, captured Peterhead, Aberdeen, and Leith, on Saturday and Sunday, August 24th and 25th. Again steering north on the 26th of August, off Wick he fell in with the Inflexible, and once more proceeded southwards.

Sir George Tryon. We now return to Sir George Tryon. Still holding to his post at the entrance to the Channel he kept with him the Hercules, the Neptune, the Conqueror, the Invincible, the Rupert, the Black Prince, the Warspite, the Northampton, the Shannon, the Belleisle, the Hotspur, and the cruisers Aurora, Galatea, Forth, Melpomene, and Marathon. The battleships Rodney and Howe, and the cruisers Undaunted, Narcissus, Thames, and Medea, were despatched under the orders of Admiral Tracey to protect the Thames and the East Coast. On his passage up the East Coast, Admiral Tracey was reinforced by the Ajax. Continuing his advance Admiral Tracey fell in with Admiral D'Arcy Irvine's squadron. The engagement which ensued forms the closing scene of the mimic campaign. It is thus described by the correspondent of the *Standard* from on board the Collingwood:—

Engagement off Scarborough. "It was off Scarborough, on Thursday afternoon, that we, the Anson, Collingwood, and Inflexible, saw that we had to reckon with a foe twice our strength, stretching out between us and the shore. The Howe, Rodney, and Ajax, all first-class battleships, the Undaunted and Narcissus, first-class cruisers, and the Thames and Medea, cruisers of the second class, rapidly approached us. The Admiral decided that we must try for the open sea; and it was none too soon that we did so, for even as our helms were put hard-a-port out from the Howe flashed the first gun. Five minutes more saw us in the thick of the fight. Although our vessels fought splendidly, and fired volley after volley into the foe, the Inflexible was losing ground, and already the enemy was surrounding her. Still, she did not cease her efforts; but, a few minutes later, when the smoke cleared away, we saw that she was caught, and had hauled down her flag. The enemy now had

Inflexible lowers her flag.

but two to deal with. The Anson, always a powerful sailer, was rapidly gaining on the Howe; but the question now was, what about ourselves? The Rodney, who was chasing us, seemed creeping closer; the smoke, as well as the sound of her guns, seemed nearer every minute. What did it mean? Our speed was usually great, why was it that we were thus being overhauled? The answer was not long in coming; our engines could not attain their full speed owing to inefficient stoking. Then we knew that we were doomed. Nothing now but a similar breakdown on the Rodney could save us. Our captain, nevertheless, determined to fight to the last, so again and again our forty-six tonners belched forth their tremendous discharges, and we, too, were now firing from the tops. The Rodney returned our onslaught with zeal, but drew nearer and nearer.

Capture of Collingwood.

"At this moment, Captain Harris performed a strategic movement, which had one good effect at least—it directed the attention of the Howe from the Anson, which was now getting well away, but otherwise it did us no good. In the confusion and darkness of the smoke he put his helm hard down, and when the air was clear again we were travelling as fast as we could upon another course. But our speed was useless. In a moment she had seen us again, had altered her course also, and was after us once more; and, twist and turn as we might, we had no more chance of escaping her than the hare has of escaping the hound fresh from the leash. At last she drew even with us, while on our other side was the Narcissus, harassing us with her guns. After two hours' hard fighting, from our conqueror came the signal that we were out of action. 'Haul down the flag,' rang the order from the Commander on the after-bridge. In this way the end came, and the Collingwood was beaten. We had not been captured five minutes before from the Rodney came the Admiral's signal to our Captain:—'I congratulate you on the way you fought your ship.' A few minutes later the order was given to proceed at once to Portsmouth, and with that ends the story of this good ship in connection with the Manœuvres of 1889."

The limited use made by Admiral Baird of his slow ironclads seems to call for some explanation. It may be best given in a further extract from Admiral Baird's general order:—

Admiral Baird's slow ironclads.

"The Northumberland, Monarch, Devastation, and Iron Duke, which have been with my flag during all these manœuvres, have, from my point of view, been forced to take an inactive part, their collective speed being only eight knots (that of the slowest ship). I have always felt that the great ambition of my very old friend, Sir George Tryon, would be to take me a prisoner. Now, as I had not the slightest

intention to hand over my sword to the Admiral of the A fleet, I may have been a bit over cautious in not striking at Liverpool when he has been reported as cruising in the chops of the Channel. All the same, I am confident there was a deep scheme laid for my capture had I attempted to move north of Carnsore, and I feel that more caution has been taken from this personal feeling than would have been exercised in actual war, which, perhaps, it is as well to mention, reference having been already made in public prints as to this inaction."

II.

Lessons of the Manœuvres.

We may now proceed to gather up some lessons from the manœuvres, and first as to the results obtained in the training of the Navy. As a test of the efficiency of the ships, the manœuvres are of the greatest value. As a means of training officers and men, the usefulness of the manœuvres is limited to the higher ranks. The strategical abilities of officers in high command have been put to the proof as they have never been before in time of peace, and many brilliant deeds have been done in the handling of ships and fleets. The strain on the commanders has been most severe—it is a question whether it has not been too severe. On many grounds it would seem undesirable to keep the same officer in command in the Channel Fleet and during the manœuvres for three years in succession. The Channel Fleet is constantly at sea. It should be our great squadron of experiments and for the trial of ships of novel types. The responsibility of such a service with the added anxiety of the manœuvres is exhausting to the individual who happens to hold the appointment. It would seem desirable that the command of the Channel Fleet should be for two years. The change would afford an opportunity of giving valuable experience to a greater number of flag officers.

Training of officers.

Training of junior officers.

Turning to the junior ranks, by keeping the ships taking part in the manœuvres in commission for a somewhat longer period, it would be possible to carry out the drills and instruction of the younger officers in an effective manner. More time could be devoted to steam tactics, officers of watches being placed in temporary charge of the ships.

Training of the men.

For the seamen of the fleet the manœuvres are of comparatively little advantage for the purposes of instruction. The ordinary drills are of necessity often interrupted; there are no exercises aloft, and

boats are rarely ordered away. The distasteful operation of coaling is the only occasion for muscular effort. If the work is not laborious, much discomfort is endured at sea in ships of low freeboard. As soon as the wind pipes up, and the billows begin to rise, sky-lights and ports must be closed. Artificial ventilation will not give freshness to the atmosphere of the confined and crowded lower deck. To add to the discomfort, when green seas are sweeping the decks overhead, water will find its way below. Happily, the manœuvres do not last long, Every man knows that the Navy is on its trial before the country, and professional spirit keeps men silent who might be disposed to grumble.

Want of Cruisers.

The want of cruisers for look-out and despatch duties was strongly felt by the Admirals in command both of the British and the attacking squadrons. It was fatal to Admiral Baird. To keep touch with the enemy is of vital importance in maritime warfare. While uncertain as to the movements and strength of the foe, the greatest commander is at fault. Lord Nelson, in his famous pursuit of the Villeneuve, illustrated in a conspicuous manner the indomitable energy of his character. His efforts were abortive. He was too late everywhere. In the recent manœuvres, Admiral Baird would have made altogether different dispositions for his attack on the English coast if he had been informed of the distribution of Admiral Tryon's forces. Under modern conditions, success or failure of naval operations will depend in a larger sense than ever on the relative strength of the contending fleets in scouts and look-out ships. For such duties speed is more essential than fighting power. The combination of the armament and steaming qualities of the Archer class and the M class is too costly. Our mercantile auxiliaries could supply a valuable reinforcement of scout and look-out ships to the Navy. If the dislocation of commerce would cause inconvenience, the resources of our private building yards are such that the gap would be quickly filled up.

Personnel.

If the manœuvres brought out some imperfections of the material, they afforded an opportunity to the Navy to illustrate once more the splendid seamanship for which the British service has been so long renowned. The Admiralty conveyed officially to the officers and men of the ships engaged their appreciation of the manner in which the ships were managed and handled under trying circumstances, and in some cases in severe weather.

Mobilisation for the manœuvres.

A few observations may be added here on the progress we have made in the mobilisation of the fleet. The subject has recently been treated by Lieutenant Staunton, in a paper contributed to the

"General Information Series," published for the United States Navy. All the publications of this department, it may be observed in passing, are remarkable for the pains and ability bestowed on their preparation.

Lieutenant Staunton.

Mobilisation is accurately defined by Lieutenant Staunton as the art of passing a naval force from a peace footing to a war footing. In justice to the able naval officers who served in former days, it is but fair to observe that the British Admiralty was not quite so defective in its organisation as it is sometimes represented to have been. It is not less a satisfaction to acknowledge the services of the "Naval Intelligence Branch," recently established.

Number of ships and men in 1888 and 1889.

The large fleet assembled for the manœuvres in 1888 was manned with a completeness and a celerity never before attained. In the manœuvres of 1889 the resources for manning the Navy were put to a far more severe test. Admiral Colomb points out, that while in 1888 only fifty ships were mobilised in addition to those already in commission, in 1889 no less than ninety ships were so treated. The officers and crews required in 1888 numbered 8600; in 1889 the number was increased to 14,600.

A more recent instance of our progress in the art of mobilisation was afforded the other day at Zanzibar. Though it has no connection with the summer manœuvres we are discussing, it may suitably be referred to here. We quote from an article in the *Times*:—

Mobilisation at Zanzibar.

"The other day we seemed to be almost upon the brink of hostilities with Portugal in Eastern Africa, and the opportunity was seized to test such facilities as exist for hurriedly collecting a formidable squadron in the vicinity of the possible scene of action. It is satisfactory to be able to say that this trial mobilisation was an unqualified success. The telegraphic order from the Admiralty for the collection of all available strength at Zanzibar was issued on December 25. On that day the British squadron on the East Coast of Africa consisted only of two third-class cruisers, two sloops, one gun-vessel, one gunboat, and one surveying vessel. Other ships of Sir Edmund Fremantle's command were scattered about the very extensive East India Station, the headquarters of which are at Bombay and Trincomalee, at a distance of about ten days' steaming; two or three vessels, on their way home from distant seas, were in the neighbourhood of Aden; and yet other vessels which were available for the purpose in view were on the Cape Station, the headquarters of which, at Simon's Bay, are also at a distance of about ten days' steaming from Zanzibar. Delays, of course, arose in communicating with some, if not with all, of these ships; and some, no doubt, were

not in a condition to sail immediately the unexpected order reached them; for vessels thus suddenly summoned for what may be active work must, before they obey, endeavour to fill up with stores and coal, so as to be ready for all contingencies. Yet on January 10, fifteen days after the order went forth from Whitehall, Sir Edmund Fremantle had with him at Zanzibar, in a state to go anywhere and do anything, two second-class cruisers, eight third-class cruisers, two sloops, one gun-vessel, one gunboat, and one surveying vessel. On Christmas Day, in other words, there were at Zanzibar seven ships, mounting fifty heavy guns, and having on board about 980 men. Fifteen days afterwards the mobilisation had collected, at a distance of twenty days' steaming from London, fifteen ships, mounting 150 heavy guns, and having on board about 3300 men. This force would have been amply sufficient, in case of need, not merely to take by force, but also to occupy and hold every Portuguese military station on the coast, including Mozambique, which is fairly well fortified, Quilimane, and Lourenço Marques, in Delagoa Bay. The armament of the mobilised squadron, apart from other considerations, affords a good measure of its power. It included 34 6-in. breech-loaders, 42 5-in. breech-loaders, six 4-in. breech-loaders, 26 7-in. muzzle-loaders, 42 64-pounder muzzle-loaders, and 114 light, quick-firing, and machine guns. The vessels thus collected were the second-class cruisers Boadicea (flag) and Raleigh (Cape Station); the third-class cruisers Turquoise, Garnet, Conquest, Curacao (Cape Station), Calliope (going home), Satellite (going home), Cossack and Brisk (Cape Station); the sloops Kingfisher and Reindeer; the gun-vessel Algerine, the gunboat Pigeon, and the surveying vessel Stork. The result of the experiment should give confidence to the country."

III.

Rear-Admiral Mayne's Conclusions.

The following letters, published in the *Times* of the 5th and 20th September, present the impressions of a competent eye-witness of the incidents described.

"Sir,—I was extremely glad to read yesterday in the letter from your correspondent recently on board the Hercules the warning he gives to the British public that they should not be led to believe, on account of anything which had happened during the manœuvres of this year, that our naval forces are anything like sufficient for the work they would have to do in time of war. 'Better, far better, that no manœuvres should have ever taken place,' as your correspondent

says, than that such a deduction should be drawn. The piece of good fortune which happened to Admiral Tryon was that the fog lifted just at the time it did and enabled his squadron to discover the enemy in much closer proximity to them than they would have been in clearer weather. Had the weather been clearer the ships of the B Squadron would have seen us in time to have got away, and in all probability to have reached Berehaven or the remainder of their own squadron before they could have been caught. Had the fog not lifted they might very likely have got past the A Squadron and have been first heard of 100 miles or more up Channel levying ransom on some English port or actually off the Thames.

"Nevertheless is the credit due to Admiral Tryon that he rightly judged what his enemy's tactics would be, and had his squadron in the right place to frustrate his endeavours. As your correspondent, however, most justly remarks, no personal element or comment on the skill of two officers both so well known and so highly esteemed as Admirals Baird and Tryon should be allowed to find its way into any discussion of the manœuvres.

The navy inadequate.

"If the naval manœuvres of 1889 have brought out any one point into particularly bold relief, it is the fact that the Navy is still wholly inadequate to perform the duties it would be called upon for in time of war; and that at present, and even when the programme to be finished in 1894 is completed, unless more money is spent in modernising vessels which are still worth it than appears to be part of the Admiralty programme as at present expounded, our Navy will still be inadequate. It is evident that, assuming the attack to be delivered from where it was—viz., the south coast of Ireland, or I might almost say under any conditions, no better strategic base could have been chosen than Milford Haven, situated as it is at the mouth of the Bristol Channel, 120 miles only from Scilly, and in the best possible position for the protection of Liverpool and ports in the North. The force at the command of the defending admiral, even thus favourably placed, must be more than double the number of the enemy in the line of battle, leaving out for a moment the amount of damage which might be done by cruisers, to enable him successfully to defend our coast. As it was, the admiral, having decided that the enemy's principal attack would be on London, had to take the whole of his battle-ships to the mouth of the English Channel in order to frustrate that design; and consequently the North, and the way to London by the North, and all the valuable towns on that way had to be left wholly to their own devices. Supposing the enemy, instead of making for the mouth of the

Channel, had, immediately on the declaration of war, sent his fast squadron up the west side of Ireland and through the Pentland Firth to come down on the East, as half of it subsequently did, those ships would probably not have been heard of until passing through the Firth, or possibly the Little Minch—say nearly 400 miles north of Milford, and nearly 600 miles north of the entrance to the English Channel. It would then be useless to have followed them, and the defender's coast squadron would no doubt have gone at once by the English Channel to meet them. But the enemy, if he relinquished London, would have had plenty of time to have attacked Edinburgh, Newcastle, Hartlepool, if not Hull, and then to have doubled back upon Glasgow and Liverpool without any let or hindrance, for the remainder of the defender's squadron could not leave the mouth of the English Channel and the Bristol Channel open to the slower ships of the enemy. It would take too much space to enter into details of distance, coal endurance, &c., which would show that this is practicable, and I must ask you to accept it.

"It is plain, then, that for the adequate protection of our shores and commerce we should have two fleets, each equal to that which the enemy could bring against them; the one, if we take Milford as the dividing line, taking from that north, the other taking from that southward, comprising the English and Bristol Channels. Even with such a force, and a very largely increased number of fast cruisers, what your correspondent calls 'the element of luck' would still have to be on our side to prevent immense loss to the country. **Two fleets necessary.**

"The Bristol Channel seems to have been entirely disregarded in this war game, perhaps owing to the 'restrictions of international law' to which your correspondent alludes; but I agree with him as to the attacking of undefended towns, as I think any one must who has read the writings of French officers and civilians alike which have appeared in their periodicals in the last few years. The ports of Bristol, Swansea, and Cardiff are now quite rich enough to be worthy of an enemy's consideration. **Bristol Channel disregarded.**

"There are several 'lesser but still very important' lessons on which I may ask for space for another letter later on. My present purpose is only to emphasise the point of your correspondent's letter, which is 'worth all the rest put together'—viz., 'that our naval force is not sufficient or nearly sufficient;' to which I may add that I have grave doubts whether our leaders or the British public yet fully realise the extent of our insufficiency. Let **Summary.**

me remind you that, while we are making a great display in carrying out these manœuvres at home, our force in the Mediterranean consists of five battle-ships.

"Yours faithfully,

"September 5th." "RICHARD C. MAYNE, Rear-Admiral.

"Sir,—In the letter of mine which you were kind enough to publish some days ago I said that I proposed writing again on the second or more detailed part of the subject to which your correspondent on board the Hercules referred.

Speed.

"The first and greatest 'lesson of the manœuvres' is unquestionably that speed is everything, in accordance with the principle laid down in the old cookery book that in order to cook your hare you must first catch it. When, on the morning of the 17th ult., on the fog lifting the A squadron sighted the 'enemy' in the shape of the Camperdown, Hero, and Immortalité, the signal was 'second division to chase;' and off went the Rodney, Howe, Warspite, Conqueror, and Neptune. But in three or four hours the Conqueror and Neptune—although they are a great deal faster than the old ships—were so far behind that a cruiser was sent back to order them to join the slow part of the squadron, as they were of no use in the chase; so that practically the A squadron had only two fast battle-ships and a belted cruiser to chase with. Had the enemy not separated his fast ships or indeed, if he had had one more battle-ship, he could have turned the tables, and if his ships had been unable, on account of the advance of Admiral Tryon's slow squadron, to have taken our ships, they could at least have got safely to Queenstown or Berehaven long before the slow squadron could have got within range. In fact, as far as filling the first condition of modern battle-ships, the much-abused 'Admiral' class were the only ones which came near the mark. I am quite aware that there are very few naval men who do not now admit this great necessity, which has lately been so strongly urged by Lord Brassey in your columns, strengthened by a quotation from Sir John Hay. But I know at least one able naval officer who, when the manœuvres commenced, was inclined to the opinion that although great speed was essential for cruisers, it was not so for the battle-ships, and whose views were quite changed by the events which took place. As you are aware, in the operations on the east coast between the Anson, Collingwood, and Inflexible and their pursurers, the whole question again turned on speed. And if the Anson was not captured—a question not yet settled by the unpires—it was solely because the Howe was unable to get within the prescribed 3,000

The A squadron weak in fast ships.

Admiral class.

yards, in fact, to catch her. My object, however, in urging this feature is to point out that in order to maintain great speed we must have greater length—far greater than we have been giving for the last twenty years and more, a good deal greater than even in our last designs; that the reaction after the building of the Northumberland, Agincourt, and Minotaur, the idea of a well-known constructor in favour of giving greater breadth in proportion to length—even to the ridiculous extent of building vessels circular—was a mistake, and that the above-named vessels, at any rate as far as length is concerned, although they are far longer than any but the most modern, are still not long enough, or at least not too long.

Importance of length.

"This fact has been recognised by the Admiralty and the present Chief Constructor, Mr. William White, to a great extent. Thus the Nile and Trafalgar are 15 ft. to 20 ft. longer than the 'Admiral' class, and the new battle-ships are to be 35 ft. longer again than the Nile and Trafalgar; but in the next designs, which are, I hope, being prepared to take the place on the stocks of those now building, more length still must be given. I would remind those who are doubtful on this head that the larger vessels of the P. and O. and Cunard lines vary from 460 ft. to 500 ft. long, whilst the latest development of all, the Teutonic, is 582 ft. over all, or nearly 200 ft. longer than our latest designed war-ships. It is perhaps only fair to say that it is by the comparatively modern universal adoption of the 'twin-screw' that the old objections to length in the line of battle have been overcome. The insufficient length was very manifest when watching, perhaps, the best of our vessels, the Warspite, whilst driving against anything like a sea. When a wave a little larger than the rest came, down went the bows and up went the stern in such a way as to materially impair her speed.

Propelling machinery.

"But, Sir, though length is a great feature, it is not everything. The next prominent defect lies in the engines and boilers. It is of no use shutting our eyes to the fact that our men-of-war do not go 'from start to finish' as our merchant ships do, and that the continual breakdowns are not creditable to us. A ship, like a human being, to work well and continuously must have strong lungs and a sufficiently capacious chest to contain them. Chasing for two or three hours is no good. The other day we had a seven hours' chase, and this in actual war would frequently be extended to days and nights. In the first place we must have larger boilers and those with larger tubes, so that they can be kept comparatively clean when under steam, and not be liable to the continual choking, which means, of course, inability to maintain speed. The fault of the engines is not so much that the whole mass is insufficient in size as that the parts are not strong enough.

Larger boilers.

Heavier engines.

They are too ight for the stopping and starting, change of speed, &c., of the enormous weight they have to drive, such as is continually required in fleet manœuvring and man-of-war work generally. It is said by some of our Admiralty apologists that this want of size and weight is compensated for by the superior metal used in the construction of our engines. It seems scarcely necessary to answer this by pointing out that the large companies, such as those above referred to, are quite certain to employ the very best metal, and you cannot get better than the best.

Forced draught.

"The 'forced draught' is an invention of the Evil One, which should be entirely abolished beyond the use of the fans. Its principal purpose at present is to give an erroneous estimate of speed on the trial trips. It is almost impossible to use it without serious injury, or at least great risk of serious injury, to the engines. It is generally admitted by its advocates to be of use only when endeavouring to escape from an enemy, and under these conditions no captains would use it for fear of a total breakdown. In the Howe and Anson chase the other day neither captain used it, no doubt from a wholesome dread of the probable consequences. Before leaving the question of speed let me say that we have hardly a ship afloat which is not a failure in this respect, and that our fastest battle-ships do not attain to anything like a modern high speed. I believe I am right in saying that 14 knots was about the highest maintained in any chase during the manœuvres.

Free-board.

"The next point with regard to construction is that all our sea-going battle-ships should have a high free-board. Beautiful as was the sight of the Rodney, Howe, and such ships going at full speed, and wonderful as was their buoyancy under the enormous seas which they, and still more the Conqueror and Hero class, continually took on their fore-decks, it was evident that a run at full speed through the Bay of Biscay or across the Atlantic would be an utter misery to all on board, even if it were possible. The lower decks of these vessels are almost uninhabitable in anything of a seaway. What they would become after the big guns had been fired over them a few times in a chase is at present left to the imagination.

Size of guns.

"I now turn to the guns. Mercifully, the Admiralty have decided against the 110-ton guns, and our new ships are only to have those of 67 tons. But even these are too large, and it should, in my opinion, and I believe I am justified in saying in that of by far the greater number of Naval officers—be laid down as an axiom that no guns should be placed on board a ship which cannot, in the case of a break-down in machinery, be man-handled. I understand this has lately been laid down as a principle in the German navy. It is sufficient on

this head to point out that the very slightest accident, such as those which are continually occurring in ordinary circumstances to the hydraulic loading apparatus, would render the finest battle-ship utterly useless, so far as the guns were concerned, in an action. The only point in favour of the very large guns is that they can pierce 30 inches of armour. But this you do not want to do, as no vessel carries armour of that weight, or which cannot be penetrated by guns considerably smaller. The effect upon the ship herself of firing these enormous guns with distant charges has never yet been fully tested. It is stated that from the high barbettes they might be fired with safety along the line of the keel over the fore and after decks, as would, of course, be necessary in chasing and retreating. But even of this many professional men entertain grave doubts. When such guns are placed on the lower level of turrets I believe that a clean sweep would be made on the upper deck in the direction of the fire, and the deck opened so much as to make all below it uninhabitable, even if the beams were not cracked—as was done in one case—and the whole structure endangered.

Guns of too many patterns.

"The multiplicity of guns in all our ships is another great evil, manifest enough in time of peace, most serious in time of war. It is an old story now that a frigate was filled with ammunition at Malta and sent off in great haste to Alexandria, and upon her arrival there it was found that only one ship had any guns which could use the ammunition brought. There are made for the Naval service something like ninety different descriptions of gun. If one takes individual vessels one finds, for instance, that the Northumberland has on board thirteen different patterns—all, of course, requiring different ammunition, utterly useless for any other kind of gun than that for which it is made. If we take the later ships we find that the Victoria has nine and the Howe eight. In an action it is almost impossible but that the utmost confusion would prevail as to the supply of ammunition to the guns. These are too many and should be reduced to four descriptions—(1) primary armament; (2) secondary armament; (3) boat-destroying armament; (4) armament for the boats themselves. All ammunition should be, to the utmost possible extent, interchangeable between different ships. We have now a 6-pounder quick-firing gun and a 3-pounder quick-firing gun. If the 3-pounder is large enough why have the 6-pounder? If it is not large enough why have it at all?

Torpedo tubes and torpedo boats.

"The multiplicity of torpedo tubes is also a great mistake in modern ships, and the bow tube, on which so much trust has been placed, and on which so much ingenuity has been shown in cutting away the stem to place it, is worse than useless. In the torpedo boats the bow-port

could not be safely opened in a seaway; and in any vessel, the range of the torpedo being limited to 500 yards, the vessel must approach to within that distance from the enemy 'end on' before she can fire her torpedo, and, if a fast vessel, must ease her speed to prevent over-running her own weapon when it is fired. It is evident that unless every one on board the vessel attacked is asleep the torpedo vessel must inevitably be sunk in performing this operation. I believe I am justified in saying that any lieutenant who has commanded a torpedo-boat would abolish the bow-tube if permitted to do so. With a tube on the broadside or on a pivot in the centre of the boat there may be some chance, as she can approach the vessel at a good speed and turn away before firing her torpedo. Even in this case her chances are small. I stated in the House of Commons in 1886 that I considered the result of the experiments which had then been tried at Milford showed the torpedo —as to which every one was then going mad—was a largely over-rated weapon. Subsequent experience has confirmed and strengthened this opinion. The only use of torpedo-boats is for the defence of harbours, and their going to sea with the squadron and their rushing about the Channel in the way they have lately done is absurd. The torpedo is at best an under-water projectile, with a velocity of some 20 miles an hour and a range of 500 yards, subject, of course, to all the influences of tide, current, &c. Upon what ground it was ever assumed that such a weapon should supersede or even rival the gun it is not easy to see. All the effects claimed for the torpedo can be better obtained by the gun, if not even by the American pneumatic gun, as yet almost unknown here. The Narcissus is fitted with no less than eight torpedo tubes. Half of this number would be about twice too many, and some space would be gained on board the ship by a large reduction.

"I fear, Sir, I have already trespassed too largely upon your space, but trust the all-importance of the subject to the country is a sufficient excuse, the Navy being, as Sir Andrew Clarke well says in his last letter to you, the first, second, and third line of defence for England.

Summary.

"To summarise the lessons, let me say that what we require in our battle-ships is greater speed, which means greater length and simpler armament. And this brings me to a point on which I fear many of my brother officers will disagree with me at present, but which I believe must come--I mean the total abolition of the armour belt and the substitution of an armed steel deck or 'turtle-back' over the vital parts of the ship, with vertical armour only on the turrets or barbettes and to protect the auxiliary armament between them. Already we have a great dispute as to all the proportions of the belt—its width, its length, and its thickness—and I may say that, curiously enough,

the constructor who has of late been the most strenuous supporter of complete armour belts extending the whole length of the ship gave before Lord Dufferin's Committee years ago as his idea of a perfect man-of-war one with no belt at all. It is already found impossible to carry a belt which would have any real protective effect along the whole length of the newer and longer ships. How much more, then, if another 80 ft. or 100 ft. be added to their length? The difference in the weight of the guns which I propose would not be any adequate compensation for this difference. Although we shall no doubt cling to the belt for some little while longer, I believe the other requirements of a modern battle-ship will be found to render its abolition necessary. As you are no doubt aware, water-line shots have always been very rare in action. The weight, the cost of the belt, are enormous, and my belief is that the objects sought can be better obtained as above stated. It may be asked, if the views I have expressed are right, are we right in building the vessels laid down in this year's programme? The answer undoubtedly is 'Yes,' because these vessels must be built according to our present lights. They are required to bring the Navy, not to what it ought to be in 1894, when they are all completed, but to what it ought to be in 1889—in fact, to bring up our Navy to the point it should have been kept at all along.

"I have not touched upon the fast cruisers, and can now only further trespass upon your space to say that I hope the 'unalterable programme' will be found sufficiently elastic to lengthen our new cruisers by at least 40 ft. or 50 ft. before it is too late. It is hardly too much to say that another very important lesson of the manœuvres is, not only that the cruisers are numerically wholly insufficient for our requirements, but that few, if any, of them fulfil the purposes for which they are wanted. I believe I am quite safe in saying that we have no cruisers which could cross the Atlantic at 18 to 20 knots—or anything near it—as the modern mail steamers do. We have gone in far too much for protection and armament in the 'eyes' of our fleet. Our 'eyes' are not required to fight in action, and should be only sufficiently protected to defend themselves from similar vessels. What the Commander-in-Chief wants is a number of vessels which can bring him news from any part at almost railway speed. If half-a-dozen such were captured it would have no effect upon a war, and their officers and crews would no doubt be well treated. Again apologising for the length into which I have been drawn, Cruisers.

"I remain, yours faithfully,

"RICHARD C. MAYNE, Rear-Admiral.

"September 20th."

IV.

Attack on Gibraltar.

The sham attack on Gibraltar by the Channel Squadron under Admiral Baird deserves mention as one of the most suggestive exercises of instruction which have been carried out by the Navy since the last publication of the *Annual*. Such an experiment is valuable alike to the military and the naval forces. To the former it affords the opportunity of testing the efficiency of their organisation to resist attack. If there are weak points in the defences, they are discovered and strengthened. A similar attack was made later on. Gibraltar was surprised and attacked by the English Mediterranean Ironclads, the Agamemnon, Alexandra, Benbow, Colossus, Dreadnought, Edinburgh, and Temeraire. The Gibraltar defences were got ready in a quarter of an hour.

CHAPTER II.

FOREIGN MANŒUVRES.

I.

FRENCH MANŒUVRES.

MANŒUVRES IN THE MEDITERRANEAN: FIRST PERIOD.

WE now turn to the manœuvres in which the fleets of foreign navies have been engaged. We begin with the French manœuvres of which a detailed narrative has been given in the pages of the *Rivista Maritima*. Manœuvres were executed by the French Navy both in the Mediterranean and in the Atlantic. The vessels which took part in the Mediterranean were the following: Ironclads—Formidable, Baudin, Courbet, Duperré, Dèvastation, Redoutable, Duguesclin, Bayard, and Vauban; Cruisers—D'Estrées, Seignelay, Milan, Condor; Sloops—Papin and Inconstant; Torpedo-sloops—Flêche, Dragonne, Bombe, and Dague. Seven sea-going torpedo-boats of the Captain Mehl type and ten other torpedo-boats of the first and second-classes. The Admiral in chief command was embarked on board the cruiser Desaix. All captains in command of ships in the Reserve at Toulon were embarked for purposes of instruction upon the ships of the squadrons engaged in the manœuvres. The ships we have enumerated were divided. The first squadron under Vice-Admiral Alquier consisted of six ironclads, three cruisers, three torpedo-sloops, and five torpedo-boats. The second squadron under Vice-Admiral O'Neil consisted of three ironclads, three cruisers, one torpedo-sloop, and two torpedo-boats.

Ships taking part in.

Two squadrons formed.

The following was the general idea of the manœuvres. An enemy's squadron, advancing from the east, after having devastated the coast of Provence, steers along the coast to the west of the mouth of the Rhone. A disembarkation is to be attempted at a point not previously determined. For the defence of the coast of France thus

General idea of the manœuvres.

threatened with attack, the Mediterranean Squadron is the only available defence. It is assumed that no land forces are posted between the Rhone and the Pyrenees. Admiral Alquier, the Commander-in-Chief of the defending squadron, makes his dispositions in communication with the Commander-in-Chief at Toulon, and has complete discretion as to the movements to be ordered. It is to be his duty to prevent his line of defence from being cut, and he is to oppose, both by land and by sea, according to circumstances, every attempt to disembark a hostile force. An enemy's squadron under the command of Admiral O'Neil is to endeavour to force the line of defence.

Declaration of war. On the 30th of June war was declared at Toulon, and the Squadron of Admiral O'Neil proceeded to Ajaccio. On the 3rd of July the first important incident in the manœuvres took place. The ironclads of the enemy, the Baudin and the Redoutable, and the sloop Papin, taking advantage of a night when there was no moon, and steering by the Planier Light, arrived before Marseilles without being seen. At daybreak the ships commenced the bombardment of the town, and continued it for a period of four hours. As soon as the news of the attack on Marseilles reached Vice-Admiral Alquier, he weighed from Ciotat and went in pursuit. The enemy waited until the defending force had arrived within a distance of 3000 yards, and then made off.

Attack on Bandol. While these events were taking place off Marseilles, the torpedo-boats of the defensive force at Bandol came in from a cruise at sea and anchored in the Bay of St. Nazaire. About 11 o'clock in the morning, the Baudin and the Redoutable were signalled in company with the D'Estrées, and one torpedo-vessel. Shortly afterwards the Redoutable separated herself from the other ships, and steered at full speed upon Bandol. The seven torpedo-boats of the defensive force immediately put to sea, and made an attack upon the ironclad, which delivered a heavy fire upon the assailants from her Hotchkiss guns at a distance of 2000 yards. In the meantime the fire of the heavy guns was directed upon the railway viaduct of Bandol. It was assumed that the result of this encounter was the destruction both of the railway and of the torpedo flotilla of the defensive force. Towards three in the afternoon the ironclad Courbet, belonging to the attacking force, proceeded to bombard St. Cyr and Ciotat.

Toulon. Towards 3 o'clock in the afternoon on 3rd July, the Baudin and the Redoutable, after their departure from Bandol, made a demonstration against Toulon. They fired several shots over the Isthmus of the Sablettes. At the distance from which they made their attack

several shots would have fallen into the roadstead of Toulon. All the torpedo-boats went out. On their approach the enemy steered to the south, and at 6 o'clock were no longer in sight.

After these incidents the squadron of defence was divided into three groups, one to the westward at Cette, another to the eastward, between Marseilles and Toulon, and a third under the Admiral was stationed in the centre off Marseilles. **Division of the defensive squadrons.**

On the 3rd July the Port of Cette was attacked and captured in a few minutes by the enemy's ships Seignelay and Dragonne. Under cover of the mist, the Dragonne was able to enter the harbour and turn round inside the mole, without being seen. The watchman at the semaphores signalled the enemy to the torpedo-boats much too late. The Dragonne directed her fire upon the torpedo-boats of the defensive force with her quick-firing guns, while the Seignelay bombarded the city and the harbour. **Attack on Cette.**

During the night of the 4th July a collision occurred between two of Admiral O'Neil's ships. In the morning the D'Estrées came into the roads under convoy of the Courbet and the Condor, so much injured as to be unable to take any further part in the manœuvres. **Off Toulon.**

At 5 A.M. on the 4th July five of the enemy's ships presented themselves in front of Port de Bouc and bombarded the place heavily. During the daylight of the 4th no part of the enemy's force was seen before Marseilles, Toulon or Bandol. **Bombardment of Bouc.**

About mid-day on the 5th July the enemy's squadron appeared suddenly off Cette, coming from the westward. The force consisted of the Vauban, Courbet, Redoutable, Dragonne, and Condor. These ships bombarded the town and executed various evolutions in the roadstead until 5 P.M. The torpedo-boats of the defence were unable to go outside the harbour, in consequence of the heavy fire and the frequent attacks of the Condor and the Dragonne.

The arrival of the French squadron was anxiously expected, but at 6 P.M. the enemy's force stood off to sea, leaving the Seignelay as a look-out ship at a few miles from the coast. In the morning no enemy's ship was in sight.

Towards evening of the 5th July the ships of the French squadron weighed and went in pursuit of the enemy, who was signalled at sea, steering eastward at full speed.

On the 5th July the torpedo-boats of the defensive force at Bandol went out in the morning. Towards evening a torpedo-boat and a vessel—probably the Coureur—were seen, and a heavy fire was opened upon them. Shortly afterwards the torpedo-boat returned, and the flotilla, with the Corse, proceeded to Hyères.

D 2

On the 6th July the French squadron arrived at Hyères about 11 A.M. and there found the whole of the enemy's squadron, which had been able to effect without resistance a disembarkation.

The entire fleet, preceded by the Desaix, returned in the evening to Toulon and anchored.

Conclusions of French press.

The operations in the Mediterranean attracted great attention in the French press. The *Temps* considered that the advantage in speed which had been given to the attacking force constituted a vital element of superiority, and more than compensated for the relative deficiency in the number of ships. The attack had been greatly favoured by the prevalence of mist in the early morning. The torpedo-boats were not considered by the writer to have made a successful defence. The main lesson to be drawn, in the view of the *Temps*, was that the number of cruisers in the defensive force was inadequate, and that the French fleet as a whole was deficient in swift cruisers.

The *Journal des Débats* declined to admit that the results of the operations were so discouraging as they were considered to have been by some critics. Every means had been adopted to secure advantage to the attacking squadron.

The *Yacht* held strongly that for the defence of ports and coasts special vessels were required, which could usefully combine with guns of position in making an effective defence. The best means of giving protection to a coast was to threaten the shores of the enemy, and not to be deterred from taking the offensive by the apprehension that the foe might be engaged in delivering an attack upon your own shores. A strong place would not suffer much injury from a naval attack. The bombardment of undefended towns should not be attempted except as an act of reprisal.

Manœuvres in the Mediterranean: Second Period.

In these manœuvres an attack was to be made against the islands of Hyères, while another attack was attempted against Toulon. The operations were to last about thirty-six hours.

Ships taking part.

The squadron under Admiral Alquier consisted of six ironclads, one fast cruiser, and nine sea-going torpedo-vessels. Admiral O'Niel's squadron consisted of three ironclads and five cruisers.

At 8 A.M. on the 23rd July the attacking squadron took its departure from Toulon. The squadron under Admiral O'Niel weighed somewhat later. The roadstead of Toulon was defended by booms, leaving certain openings defended by steam vessels armed

with quick-firing guns. The boom could be lighted at night with the electric light.

On the nights of the 23rd–24th July the attacking squadron attempted to force the entrance to Toulon, but was vigorously repulsed by the squadron of defence anchored within the entrance, and by the torpedo-boats outside. A strong wind was blowing, with a heavy sea, and some collisions occurred in the torpedo flotilla, four vessels being seriously disabled. **Attempt to force entrance to Toulon.**

On the 23rd, before the night attack on Toulon, the attacking squadron made an attempt against Hyères, protected by the defending fleet. The landing party of the Inconstant took possession of the Titan Lighthouse, which is situated on a small island. Bregançon, Léaubes, and Porquerolles were successfully cannonaded.

On the morning of the 24th the manœuvres came to an end, the state of the sea not admitting of their being continued.

Manœuvres on the North Coast of France.

We now turn to the manœuvres on the North Coast of France. The general idea of the first operations was as follows:—(1) A squadron coming from the eastward seizes a position on the coast and converts it into a base of operations for a landing in force. The torpedo-boats from Cherbourg attack the squadron at anchor. A landing follows. The army at Cherbourg compels the troops who had landed to re-embark. (2) The squadron makes an attack by day and night on the entrance to Cherbourg. **General idea.**

The attacking forces consisted of the ironclads belonging to the Channel Squadron, under the command of Rear-Admiral Boissoudy. The squadron included the ironclads Marengo, Océan, and Suffren, the cruiser Sfax, the torpedo cruiser Epervier, the sloop Ibis, the sea-going torpedo-boat Dehorter, and one second-class torpedo-boat. The defending force was under Rear-Admiral Planche, and included the coast-defence ironclads Vengeur and Tonnant and the armoured gun-boat Grenade, with the torpedo-boats told off for the defence of Cherbourg. **Ships taking part in.**

On the 2nd July, the date on which hostilities were to commence, the squadron of Admiral Boissoudy anchored in the roadstead of La Hogue. A party was landed from the Ibis and took possession of St. Vaast. Preparations were made for defence against an attack which might be expected from the ships stationed at Cherbourg. At 10 P.M. the small vessels attached to the attacking fleet went out upon a reconnoitring expedition. The Epervier steered northwards in the **Operations at La Hogue.**

direction of Barfleur, and the Ibis southwards towards St. Marcouf. They were accompanied by steam launches carrying electric lights. The ships at anchor maintained a vigilant watch with their search lights.

Engagement

From midnight until 2.30 A.M. the ships sustained a vigorous attack from the defending squadron under Rear-Admiral Planche. The ships engaged were the Tonnant and Vengeur and eight torpedo-boats. The coast-defending ironclads did not close with the enemy, this duty being assigned to the torpedo-boats alone. The sea was somewhat disturbed by a breeze from the westward, and the torpedo-boat, No. 54, going at a speed of from 14 to 15 knots ran into the Dehorter. The injuries received were comparatively slight, and the torpedo-boat was able to make its way in safety to Cherbourg.

At daybreak the Tonnant and Vengeur returned to Cherbourg with the torpedo-boats.

Throughout the 3rd July the attacking division remained at St. Vaast, keeping a vigilant look-out for the enemy. The sea being rough, the torpedo-boats from Cherbourg did not attempt an attack. It would have been impossible to discharge the torpedoes.

Attack on Cherbourg.

On the night of the 3rd–4th July the attacking division was disturbed by two or three false alarms. The division had suffered much in the attack the previous night. It appears certain that three of the ships were placed *hors de combat*. On the morning of the 4th, in anticipation of an attack, numerous detachments of artillery were told off from Cherbourg to the forts and batteries commanding the roadstead and the line of coast. At 1.30 P.M. the enemy's squadron was signalled to the eastward, coming up from St. Vaast. The force consisted of the Marengo, Océan, and Suffren. The other ships, the Sfax, Ibis, and Epervier, stood off and on, near Cape de la Hogue. As soon as the enemy was within range the battery at Bretville commenced a vigorous cannonade with heavy guns. The defending squadron, under steam in the roadstead, got under way and stood to the eastward, to intercept the enemy and protect the eastern entrance. The enemy's squadron kept at a distance from the entrance and continued to steer to the westward. The Tonnant, Vengeur, and Grenade turned round to meet them and steamed through the roadstead to the western entrance. The enemy's squadron was fired upon, while passing along the breakwater, from all the batteries within range on the mainland, and from those on the breakwater. The attacking squadron stood off to seaward, followed by the Tonnant, Vengeur, and Grenade, which commenced a heavy fire as soon as they were within range.

The operations of the day were little more than a skirmish, in which the two adversaries endeavoured to gain information as to the force opposed to them. The signalling service was well performed. The general result was held to be favourable to the defending force. During the night the attacking squadron kept at sea. **General result.**

About four on the morning of the 5th July the enemy's squadron was seen, in order of battle off Fort Querqueville. The weather was misty. Unchecked by a heavy fire from the forts and from the coast-defenders, the three ironclads steamed onward at full speed, and, keeping up a fire from both broadsides, succeeded in forcing their way through the western entrance and anchored in the roadstead. This dashing operation terminated at 4.20 A.M. Both the dockyard and the city were exposed to serious injury from the enemy. **Second Attack on Cherbourg.**

In the meantime, the division of cruisers, headed by the Sfax, steamed along the coast, protected by the mist and by the distance from the fire of the batteries on shore. An attempt was made to disembark at Urville, a landing-place about four miles from Cherbourg. The position was vigorously defended by the land forces, and in spite of the heavy fire maintained from the cruisers the disembarkation proved impossible, owing to the state of the sea. **Attempt to land at Urville.**

After having failed off Urville the division proceeded to Vauville, where a few troops were successfully disembarked. The men who had landed were attacked by a defensive force coming up from Cherbourg, and were driven from their position at the point of the bayonet. The attacking squadron remained at anchor in the roadstead, with steam up, until 6.30 P.M., at which hour three ironclads, Marengo, Océan, and Suffren, went out to sea, leaving the second division, viz.:—the Sfax, Epervier, and Ibis, at anchor.

At 10 P.M. the ironclads were signalled from the northward, steering for the western entrance. The electric search lights of the defending force discovered their approach before they were within gun-shot. About 11 P.M. a vigorous fire was commenced from all the forts, which lasted fifteen minutes and was at its height when the three ironclads made for the western entrance. The coast-defenders at anchor near the entrance poured a tremendous fire from their Hotchkiss guns upon the ironclads. It appears probable that in actual war an enemy exposed to so heavy a fire would not have been able to force the entrance. **Night attack on Cherbourg.**

With this attack the first period of the manœuvres on the north coast of France was brought to a close.

Manœuvres on the North Coast of France: Second Period.

The operations consisted of an attempt to deliver an attack upon Brest, and to force the passage through the Goulet, by a portion of the northern squadron.

On the 22nd July the squadron commanded by Admiral Boissoudy, consisting of nearly the same force as had previously operated against Cherbourg, anchored off Morgat. At 5 A.M. on the same day the defending squadron including the coast-defenders Tonnant and Tempête, with twenty torpedo-boats, under the orders of Rear-Admiral de Cuverville, sailed out of Brest and anchored off Cammery until nightfall.

Operations off Brest. During the day the northern squadron attempted the demolition of the coast batteries to the south of Brest, and disembarked a small force in the bay of Morgat. In the afternoon the enemy returned to Douarnerez and took every precaution against a night attack. The ships were anchored in two lines and were protected by a small island and by obstructions consisting of spars attached to buoys. At nightfall the cruisers and torpedo-boats were sent to cruise outside the anchorage. Boats were sent to lie inside projecting points of the coast, ready to signal the approach of the enemy's torpedo-boats. The electric lights were constantly employed.

During the night of the 22nd the defending squadron attempted an attack. It had been laid down that torpedo-boats alone were to be used for night attacks. The attempt on this occasion was unsuccessful.

Attack on Brest. On the 23rd at 8 P.M., the defending squadron weighed. The sea was heavy, and the torpedo-boats suffered considerably. The squadron, however, persevered in pushing for the Bay of Douarnerez, where another attack was prepared. The northern squadron was still better secured against an attack than on the previous night, and on the 24th the defending squadron returned to Brest.

On the 25th all the batteries on the coast were manned. The squadron of defence, consisting of the Tempête, Tonnant, and the torpedo-boats, got under way from Brest. At 11.30 A.M., the enemy's squadron was signalled. The three ironclads were advancing in line, followed by the torpedo-boats. A heavy fire was opened upon them from the Tempête, Tonnant, and the forts. At 1.15 P.M. the attacking force made its way into the roadstead, after which it again proceeded to sea, steering for the northward. At 2.30 P.M. the Sfax, Epervier, and Ibis, which had not taken part in the attempt to force an entrance, came in and anchored in the

roadstead. At 6 P.M. the ironclads under Admiral Boissoudy, in obedience to a signal, returned and anchored off Brest.

French opinion on the manœuvres.

The professional writers in the *Broad Arrow*, and in the French newspaper, the *Yacht*, in reviewing the manœuvres, were of opinion that the incidents described would not have occurred in an actual conflict. The defensive fleet, with less speed but greater fighting power than the assailants, would not have confined its efforts to a mere defence of the coast. This duty would have been assigned to local vessels, and an attack would have been made on the coasts of the enemy, positions being taken up which would cut off the enemy's retreat from his base of operations.

Want of scouts.

The French critics were unanimous in insisting that the failure of Admiral Alquier had proved conclusively the necessity for strengthening their fleet in scouts and torpedo-vessels. In the columns of the *Nouvelle Revue* Commander Z. maintained that if the defensive squadron had possessed three times the number of cruisers and sea-going torpedo-vessels it would always have been informed of the movements of the enemy, and would have been able to keep touch with him, so as to make an attack by night with the greatest chance of success. The writer was convinced that no ironclad squadron would ever attempt to deliver an attack on a coast sufficiently defended by cruisers, look-out ships, and swift gunboats. A bombardment might possibly take place in the daytime, but in the succeeding night the destruction of the enemy by the torpedo-vessels of the defensive force was inevitable.

Admiral Aube's opinion.

The writers of the school of which Admiral Aube is the leader further hold it to be impossible to make an effective coast defence by means of ironclads alone. They maintain that ironclad squadrons may hold the dominion of the seas, but are utterly ineffective for coast defence. They hold that the defence of a coast must be secured by organising on the most important points of the coast permanent flotillas of special vessels.

The French ships did not get through the manœuvres without some of those accidents to which attention was directed by the correspondents who accompanied the British squadron. The collision between the D'Estrées and the Courbet has already been mentioned. There was more or less failure of boilers in the Flêche, Dague, and all the other torpedo-sloops. The Fusée lost her rudder.

Torpedo-boat success.

The *Marine Française* expresses the opinion that the torpedo-boats scored a decided success. Of forty-two attacks made by these boats, and by vessels of the Bombe type, twenty-two were successful. The

Dragonne and the Condor forced the blockade of Toulon, without being seen by Admiral Alquier's squadron, stationed outside. The ironclad Bayard was attacked with success in daylight by a torpedo-boat which forced its way through obstructions, consisting of torpedo-nets, which closed the entrance to Toulon.

Lessons taught.

The experiences of the French naval manœuvres in the Mediterranean point to the value attaching to speed in vessels designed for coast defence. It is of the first consequence to be promptly at the point threatened, as soon as information is received of the approach of an enemy. The French Admiral felt the want of cruisers not less keenly than the commanders of the British squadrons. The French operations in the Channel and those of the Russian fleet in the Gulf of Cronstadt, lasting but a few days in either case, convey new lessons.

II.

German Naval Manœuvres.

In Germany the instruction to be derived from naval manœuvres has been systematically given by the mobilisation of a considerable fleet for the cruising season. In the operations last autumn, three armoured corvettes and some light vessels took part. A division of armoured gunboats of the Wespe type was engaged in the defence of the coasts between Wilhelmshaven and Cuxhaven.

A permanent squadron of evolution has been formed, consisting of four of the newest ironclads, the Kaiser, Deutchland, Preussen and Friedrich der Grosse, with the despatch-boat Wacht. This squadron is at present in the Mediterranean.

The German squadron of instruction for the present year will include a training squadron of four ironclads and a sloop; a reserve squadron of two ironclads, a coast-defence ship, and two sea-going torpedo-boats; a flotilla of three coast-defence ships; and another flotilla consisting of a sloop, two sea-going torpedo-boats, twelve coast-service torpedo-boats and a training-ship for cadets.

III.

Russian Naval Manœuvres.

The Baltic.

The Russian naval manœuvres took place in the Gulf of Finland. The operations off Sveaborg lasted from the 8th until the 15th August, and those off Cronstadt from the 21st to the 28th of the month.

The general idea was as follows :—

An enemy with a powerful fleet had occupied the Gulf of Riga, and had made it the base of operations for the blockade of the Russian fleet of inferior force in Sveaborg. The blockaded fleet harassed the enemy by persistent attacks by day and night, raised the siege, and compelled the enemy to retire after having bombarded the town.

Operations off Cronstadt. These operations being concluded, the hostile fleet took up a position from which it was possible to disembark troops for an attack on St. Petersburgh. Cronstadt was bombarded. The Russian fleet retired under the protection of the guns of the fortress. The small vessels of the enemy endeavoured to force a passage through the south channel commanded by the batteries of the town. These attempts proving unsuccessful, the enemy quitted his position and endeavoured with his small steamboats to disembark a force by night and to attack the defences of the south channel. The operation failed.

Another fruitless attempt was made to force the channel. The enemy retired, and after having repaired damages made an attempt to pass through the north channel. This attack also was repulsed, and the operations came to an end.

Vessels taking part in. The forces engaged were as follows :—The attacking vessels, under the command of Vice-Admiral Kopytov, consisted of the battle-ships Peter the Great, Herzog Edinburgskii, and Admiral Spiridoff; the coast-defence vessel Charodeika; the fast-cruisers Viestnik, Plastun, Opritchnik and Strelok; the torpedo-cruiser Lieutenant Ilyn; the schooner Slavianka; the steamboats Razboynik and Ilmen; and twelve torpedo-boats of various kinds. The defending vessels, under Vice-Admiral Schwartz, consisting of the coast-defence vessels Latnik, Bronenocetz, Strieletz, Perun and Vieshtchun; and the gunboats Bouria, Groza, Dojd, Vikhr, Bouroun and Snieg. The umpire-in-chief was Vice-Admiral Pilkin.

Black Sea. In the Black Sea a Russian fleet, consisting of the two new iron-clads Tchesmé and Catherine II., with four gunboats, made an attack, lasting for three days, on the fortress of Otchakoff. It would appear that it was found impossible to provide the ships with their full complement of men.

IV.

UNITED STATES.

Squadron of evolution. The revival of the United States Navy has been marked by the forming of a powerful squadron of evolution, comprising the Chicago, the Boston, the Atlanta, and the Yorktown, the command of which

has been given to Commodore Walker. The squadron has already visited Lisbon. In the spring the ports of the Mediterranean will be visited, and in the summer those of England and Northern Europe. The passage of the squadron across the Atlantic has been thus described in the columns of the *Army and Navy Gazette* of New York by Flag-Lieutenant Staunton :—

Passage across the Atlantic.

"From the 12th to the 17th we had fresh breezes and moderate gales from the southward and westward with a heavy sea. We passed the Western Islands on the 17th. From that date to the 21st we experienced pleasant weather with little or no wind. During the passage the squadron routine drills established by Admiral Walker were put into operation. The Chicago, Boston, and Atlanta showed excellent seaworthiness, maintaining speed and station with few changes in all weathers. The ships showed excellent coal endurance, the Chicago arriving here with 300 tons in her bunkers, and the Boston and Atlanta with over 100 tons each. The squadron steamed all the way from Boston to Lisbon at the rate of over 200 miles per day without the slightest injury to machinery and using something less than half boiler power. The ships are comfortable and steady in a seaway, so much so as to show clearly that the guns could be easily fought in heavy weather. We used sails whenever the wind was fair."

Many able officers of the United States Navy are attached to Admiral Walker's fleet, and great care has been bestowed on the selection of the crews. It has been proposed that four other vessels, the Baltimore, the Petrel, the Concord, and the Bennington should be added to the squadron of evolution.

In America the manœuvres of the British Navy have been watched with deep interest, and a strong desire has been expressed that so soon as some of the new ships now in progress are completed they should be commissioned for an annual course of manœuvres on the coasts of the United States.

CHAPTER III.

TRAINING.

I.

BLUEJACKETS.

TRAINING and constant exercise at sea is the first condition of naval efficiency. Our advantage in this regard over enemies too long cooped up in blockaded ports secured for us our splendid triumphs under Lord St. Vincent, Nelson, and Collingwood. In elaboration and perfection of theoretical training, in efficiency of instruction in gunnery and the torpedo, we claim no advantage over the navies of France and Germany. When we look from scholastic and scientific to practical instruction, the officers of the British Navy have wider opportunities than are open to those of foreign navies.

Mediterranean Squadron.

The Mediterranean Squadron is the finest school of instruction for the British Navy. The squadron at present consists of the ironclads Dreadnought, Agamemnon, Temeraire, Collingwood, Benbow, Colossus, Orlando and Polyphemus. The unarmoured list includes the Hecla, Phæton, Carysfort, Scout, Surprise and Fearless; and the gunboats Landrail, Dolphin, Albacore, Gannet, Starling, Cockatrice, Goshawk, Imogene, Melita, and the training-ship Cruiser. Under the able command of Sir Anthony Hoskins we may be assured that the Mediterranean Squadron will not be allowed to fall from the high state of efficiency and discipline in which he found it on taking over the command from the Duke of Edinburgh. During the autumn of 1889 nearly every harbour in the Archipelago suitable for heavy ships was visited.

Training Squadron.

The Channel Fleet is our other great school of instruction. The introduction of mastless battle-ships in lieu of the older types, so suitable for the purpose of training, which have until now been retained both in the Channel and in the Mediterranean, has given a new importance to the work done in the Training Squadron. Every young officer and every seaman should gain his first experiences at sea by some two or three years of service in the Training

Squadron. With the exception of the Pacific Station the Training Squadron is the only service in which we are able to keep our young seamen for extended periods at sea, away from the debasing influences which surround them in seaport towns. A French writer has truly said that all discipline is a struggle with the lower passions of human nature, and becomes the more effective in proportion as its action is constant, unremittent, and unrelaxed. The enervating influence of periods of interrupted discipline are more and more felt now that long voyages at sea are becoming more and more infrequent.

Captain Gerard Noel, who has just completed a commission as a captain in the Training Squadron, has given a description of our training service which will well repay perusal. The following extract is from his paper recently read at the United Service Institution:—

Captain Noel on the Training Squadron.

"The Training Squadron is at present doing admirable work, although it can hardly accommodate a sufficiently large number of men to achieve the desired amount of training. The ships of which it is composed are the best of the older cruisers, and as they are fairly good steamers and well armed, there is no fear for their safety should a naval war be suddenly forced upon us. They are well masted, enough to enable them to make a passage under sail, and their accommodation is satisfactory. The four ships carry about 1100 men all told, of which about half are ordinary seamen and boys under training. The work devolving on the commander or first lieutenants of these ships, augmented as it is by the frequent changes of officers and men, and the constant training duties, in addition to usual routine work, is very arduous, and these officers deserve every encouragement. The petty officers have also much more work than in most ships, owing to the youth and inexperience of those under charge, who require continual instructive supervision. The work of the other officers is nothing out of the common, beyond the fact of these ships having about double as much sea-work as any others. Besides the instruction in seamanship which is in constant progress, the ships of the Training Squadron are exercised in naval tactics either under sail, or when steam is raised under steam; the new signal books have been thoroughly studied, and it may truly be said that more signals are made in this squadron than in any other.

"During the first three years in one of these ships, the Rover, 482 ordinary seamen and 362 boys had an average of six months' training: forty-four midshipmen served on board the ship, of whom thirty passed for lieutenant in seamanship (ten obtained first-class

certificates, twelve second-class, and eight third-class, two midshipmen being turned back). During this period the squadron accomplished the distance of 55,432 miles in 11,070 hours, of which 32,210 miles and 7463 hours were under sail. Eighty ports were visited, the squadron arriving or leaving under sail alone fifty-eight times, occasionally under difficult circumstances. As a specimen of the sailing qualities of the squadron, on one occasion the passage under sail from Teneriffe to Barbados, a distance of 2580 miles, was made in sixteen and a half days, an average of 156 miles a day; on another occasion the squadron averaged under sail 200 miles a day for nine consecutive days, completing a passage home from Bermuda in nineteen days.

"The cruising of the Training Squadron in the West Indies in the winter, and in the Mediterranean, Baltic, and home waters in the summer (during which the squadron twice took part in the fleet manœuvres), was a varied experience of work, interest, and pleasure. There is reason to hope that the squadron may some day be increased in number, or, what will be even better, that a second squadron similar to the present one may be fitted out."

It is highly desirable that the Training Squadron should at once be raised to six ships. Our corvettes of the Gem class are excellent vessels for the service, and as they are withdrawn from the foreign stations they should be utilized for the Training Squadron.

Captain Noel's high opinion of the value of training in masted ships raised many expressions of dissent. The argument for Captain Noel's view merits the more attention. It was well put in a letter addressed to the *Army and Navy Gazette* by a Captain of the Royal Navy:—

Letter in *Army and Navy Gazette.*

"SIR,—Referring to Captain FitzGerald's criticisms on Captain Noel's paper on the training of our seamen, recently read at the United Service Institution, it would appear that he is under the impression that officers who advocate training our young seamen in rigged ships are deluding themselves with the idea that the specific exercises practised in these vessels as regards the manœuvring the ship under sail, and the work aloft, will be of much direct value to the men when serving in mastless ironclads. It is needless to say such is not their line of argument, but they are strongly impressed with the belief that those qualities which are generally considered to be the peculiar characteristics of the seaman are capable of being developed only under the conditions found in working a vessel under sail with all its attendant difficulties. The constant exercise aloft, often under difficult and dangerous conditions, the emulation which

Value of sail-drill.

exists between ships when drilling against each other, the enthusiasm and excitement which then pervade the whole ship's company, is the nearest approach to the reality of 'action' that we can arrive at. But in a greater degree still is this the case when men's minds and nerves are braced to some great effort, as when working the ship in or out of harbour, &c., under dangerous or difficult circumstances, or when handling the sails in a gale or any strong breeze. Judging by results, it is in this school that we must continue to develop in our young officers and men those qualities that have hitherto been considered essential to a good seaman—viz., fearlessness under circumstances of great personal danger, care for their own as well as for the lives of others, readiness of resource, quickness of eye, ready obedience, individuality, at the same time dependence on one another for mutual support. Who can say that these qualities will be developed in a mastless ironclad, where a man's life is purely one of routine, as much so as if he were in barracks? I for one think—and I believe it is the opinion of many officers of experience—that unless we are able to continue to train our young men in masted ships, they will seriously deteriorate as regards the qualities above referred to, and degenerate into an inferior marine, who in some respects are better than Bluejackets, for their discipline is better, they have more *esprit de corps*, and under certain conditions are more reliable than sailors, but lack the qualities peculiar to the intelligent Bluejacket, which are entirely due to their training in masted ships."

French opinion.

Monsieur Weyl has described in a lively narrative how constant cruises under steam benumb the faculties of the men. In his work *La Marine Militaire*, he says, "The old sailing Navy had a great influence in developing manly qualities—it inured men to danger, it trained them up to bear hardships without a murmur. The young officer charged for the first time with the duty of taking command of a watch was saddled with a heavy responsibility. With an anxious eye he watched by day and by night every indication whether in the clouds or in the sky of a coming change of weather. He was equally anxious not to lose a sail and not to waste an instant of time in making his passage. To-day where all depends on the management in the engine-room, the direction of the wind is of no importance—the duty of keeping watch is tedious and monotonous. In other days the time passed by as swiftly as the wind which carried the vessel forward on her course. The modern officer is more learned and more studious. With navigation under steam all the poetry of a sea life is at an end.

Let us wisely retain our training squadron as the best means

of giving to our officers and men their first experiences at sea. Efficient training for officers and men in the early stages of their professional career can be best obtained by keeping the sea as much as possible. "Naviget: haec summa est." This experience at sea can only be obtained by keeping up a large training squadron, and occasionally sending a flying squadron round the world. The ironclads, the torpedo flotilla, ships employed on foreign stations in support of our Consular and Diplomatic representatives, and to show the Flag, are ill adapted for the first training of seamen. **Compiler's opinion.**

The occupation of the new Naval Barracks at Keyham is one of the notable incidents of the year. As barracks on shore take the place of the receiving ships, while discipline and health may be improved, the change will render it more and more desirable that sea habits should be formed by service in a training squadron. **Barracks.**

II.

Engine-Room Staff.

The establishments of the Navy as at present organised are adapted rather to a fleet propelled by canvas than to a fleet of steamships. In the recent mobilisation no less than 3000 stokers were required. In point of numbers the supply both of officers and men was equal to the demands. It is certain that many were without experience, and that it was only by the utmost energy on the part of the senior officers and more fully trained men that accidents were avoided, and the engines were worked with efficiency. **Training of the engine-room staff.**

It is vain to expect that every officer in the service of a great navy, maintained practically upon a war footing, can in peace be found thoroughly efficient on the instant when he is called upon to go to sea. Some will not have had adequate experience; others will be out of practice. It is easy to find explanations and excuses for deficiencies which have been sufficiently criticised; but the Admiralty will not rest satisfied until their resources for the manning of a steam navy are brought up to the high standard which has been reached in the supply of the bluejacket class. The training of stokers and engineers must be considered with the care and skill which have been applied to the training of the Navy in seamanship.

The most lavish liberality in the concession of relative rank and pay will not secure efficiency. Experience is essential in the management of machinery in all states of weather at sea, and upon occasions **Need of experience at sea.**

when the utmost development of power is called for. It is in this essential experience that many young engineers of the Navy, possessing a more than sufficient knowledge of algebra and the theory of steam, are perhaps deficient. It is highly desirable to obtain for men in the Naval Service that practical experience which the commercial navy affords. In previous numbers of the *Naval Annual* it has been suggested that the Admiralty should call some of our leading shipowners into conference, and endeavour, with their assistance and co-operation, to arrange a plan by which stokers and engineers from the Navy should be enabled to make a few voyages of instruction in the finest steamers of the Mercantile Marine. We are receiving officers of the Mercantile Marine into the Navy for temporary service for the purpose of instruction in the duties of a ship of war. A reciprocal facility might be afforded by the Mercantile Marine for the practical training of the mechanical branch of the Navy. A special rate of pay might be given while serving in the Merchant Service.

Pay and promotion.

Questions of pay and promotion lie outside the scope of the *Naval Annual.* Without entering on the claims put forward on behalf of the naval artificers and others, it is a mere truism to say that the country would pay with ungrudging liberality for really effective service in the trying work which is sometimes demanded from the steam department of the Navy.

The number of officers and men in the permanent force of the fleet must be determined not only by the complements required for the manning of the ships, but by the means at our disposal for training seamen; it is useless to enter raw lads from the country for duty in the stokeholds, unless we are able to give them a thorough training for the work which they are engaged to perform. To give this training we must have more ships in commission, or keep those ships which we have in commission more constantly at sea, or we must turn perhaps to the Mercantile Marine.

III.

Pilotage.

Instruction necessary.

The instruction in pilotage is the least satisfactory part of our system of professional education for the Navy. Many officers have no opportunity of acquiring sufficient experience in a branch of the profession in which efficiency essentially depends on practice. Hence it is that accidents from unskilful pilotage are not rare. At the commencement of the manœuvres two of Her Majesty's ships ran

foul of the Trinity lightships. It is reasonable to assume that these collisions were due to want of practice in navigating ships in a tideway. On the North American Station the Lily was totally lost through neglect to use the lead. The compiler would strongly press a suggestion already on several occasions put forward. The cutters, no longer required for the Revenue Service, should be attached to the flagship at Portsmouth for the purpose of instruction in pilotage. They should cruise round the coast of England, should be frequently under weigh in the Downs at night, and should not remain in port in foggy weather. It may be mentioned that the French have always in commission a special vessel for instruction in pilotage. **Compiler's suggestion.**

IV.

Gunnery.

Good gunnery has decided many battles. Our gunnery establishments are being gradually transferred to batteries on shore. If the training in batteries is supplemented with practice in the seagoing ships now attached to the stationary gunnery ships the change will tend both to economy and efficiency. The new facilities for practice with heavy guns at sea will afford the means of making a selection of men for the important duty of captains of guns for their skill as marksmen. With the limited opportunities of testing practical qualifications, a knowledge of the mere routine of the drill-book has been perhaps unduly considered. With the reduced number of heavy guns in modern armaments good shooting has become even more essential than before. The present Board of Admiralty merit praise for the pains lately taken to extend the torpedo gunnery and hydraulic training throughout the service. Short courses have been established for officers on the retired lists, the Royal Naval Reserve the Indian Marine, and the Royal Marines.

V.

Mobilisation.

In the art of mobilisation we may derive some useful hints from a close study of the arrangements in other countries. The Germans have an admirable system for the care of ships' stores. Each ship has a special building for the reception of her equipment and stores. "Every article," writes Lieutenant Staunton, "when issued from the stores for the equipment of a ship, receives an individuality which it maintains until condemned as unfit for further service. It always **System in German Navy.**

belongs to that ship, is always in somebody's responsible charge as forming part of that ship's outfit, and cannot be diverted to other purposes. The advantages of such a method in avoiding confusion are enormous. German officers say that, aside from its military advantages, which all recognise, it is much less costly, much less troublesome, and much more convenient than the old way still followed by other powers. When a ship is in commission her ship's rooms assigned to her ordnance and stores remain empty."

Experience in England shows that the contention of the German officers is open to question.

CHAPTER IV.

Naval Reserves.

I.

Royal Naval Reserve.

In time of peace questions affecting the strength and efficiency of the Royal Naval Reserve are not of pressing interest. The difficulty is to give sufficient service at sea to the permanent force. Face to face with the strain of a prolonged struggle, the organisation on which we depend to supply our ships with crews would soon come to be regarded as of the last importance.

Weaknesses. The weaknesses of our Royal Naval Reserve in some important points of organisation were severely criticised in a recent United States official report, republished in the last number of the *Naval Annual.* It was pointed out that our Reserve has no permanent officers, and that the short periods of training are insufficient to create habits of discipline or to secure efficiency in the use of modern naval weapons. No instruction is given in submarine mining or torpedo work.

No petty officers. The Naval Reserve has no petty officers. The extra pay of 10*d.* a day for the twenty-eight days of annual drill is the only incentive to efficiency held out to a force of nearly 18,000 men.

Proper sphere of First Class Reserve. The proper sphere of duty of the First Class Reserve would be found in the manning of the mercantile auxiliaries which must be taken up in the event of war for service as scouts, look-out ships, and patrol ships. Vessels carrying the mails on the great ocean routes, armed with suitable light guns and manned with a strong complement of reserve men, would be able to beat off the raiders of similar but probably inferior type which might be sent forth by a hostile power to intercept our commerce with distant parts.

Second Class Reserve. The Second Class Reserve is scarcely less valuable than the First Class for the manning of the Navy. Under such men as Mr. Quigley, recently retired from the coastguard, over 2000 men have been annually drilled in the Naval Reserve Battery at Lerwick.

The Second Class Reserve would furnish admirable men for service in the gunboats armed for coast defence.

Our Naval Reserves compared with those of France.

There is reason to believe that our Naval Reserve though inferior in numbers is more effective than the force which exists on paper for the manning of the French Navy. It is alleged that maritime enterprise has been throttled in France by the paternal regulations of the Inscription Maritime.* The report of M. Gerville Réache on the French Navy Estimates for 1889 gives the total number liable for service in the Navy at 110,000. Of these 15,000 only are blue-water seamen, 11,000 are deep-sea fishermen, while 68,000 are engaged in the fisheries in the narrow seas on the coast and in rivers, 9000 are long-shore men.

Increase in number of.

It is stated in the *Broad Arrow* that the Admiralty have decided to strengthen the Naval Reserve of trained seamen gunners by adding considerably to the numbers allowed to be entered. The Reserve consists of bluejackets who have left the Navy at the end of their first ten years and the best seamen of the Mercantile Marine. It is the only force upon which the Royal Navy could draw to make up for the certain casualties of a war, and the proposed addition of some 2000 prime seamen will be a very real strengthening of the first line of defence.

Officers.

While no systematic plan has yet been devised for securing the proper complement of trained officers for the reserve, much has been done to improve their training. They have the opportunity of serving twelve months in a vessel of war, and their services were lately utilized during the manœuvres. With some training in the Navy as young men, officers of the Mercantile Marine may be fully qualified to do duty as officers of the watch. They would be particularly efficient for the navigating duties of the Fleet.

Number of officers.

Under the pressure of the exceptional demands of war we must always find ourselves without a sufficient number of lieutenants. It is not desirable to place more men on the list in time of peace than the Admiralty are able to employ sufficiently in seagoing ships. Vice-Admiral Le Comte de Geuydon in a recent paper observes, "The lists must be formed upon the basis of the employment which can be given at sea in ordinary times. The least amount of sea service required to secure efficiency may be put, for sub-lieutenants at three years out of four at sea, for lieutenants at two years out of every three, for commanders at one year in two, and for captains at one year in three."

It is not desirable to enter large numbers in the lower ranks for

* A French Commission is now inquiring into the working of the "Inscription Maritime."

whom there is no prospect of promotion. Under the inevitable limitation of numbers in the permanent Naval Services, the creation of a reserve of lieutenants in the Mercantile Marine is the only alternative. We have many good men in the reserve. Many more are needed. The Admiralty should prepare a scheme showing the numbers required in the several ranks, and the remuneration offered to qualified men for going through a course of instruction in gunnery, and holding themselves ready to obey the country's call. With the view to prevent inconvenience from the temporary absence of officers who hold appointments in the Merchant Service, a committee of consultation should be appointed, on which the ship-owners and the Admiralty should be represented.

Reserve of lieutenants should be created in Mercantile Marine.

The creation of an effective reserve of officers for the Navy has of late engaged the attention of the French Government. In 1888, the question was referred to a powerful Committee of the Chamber of Deputies, and an exhaustive report was prepared by M. Gerville Réache. The Committee was of opinion that such a reserve should be recruited from the retired officers of the Navy and the masters of the Merchant Service. They recommended that each officer of the reserve should be embarked every second year for a period of twenty days on a commissioned ship. It was proposed to raise the reserve gradually to 65 officers retired from the Navy and 135 drawn from the Mercantile Marine.

Reserve of officers in France.

In consultation with the leading steamship owners the Admiralty should form a strong reserve of the Second and Third engineers in the great ocean liners. It would be necessary to pay a liberal retaining fee, and to permit a suitable uniform to be worn. Honorary lieutenants and sub-lieutenants of the Royal Naval Reserve, after twelve months' service in the Navy, receive £25 and £20 a year respectively. No retaining fees have yet been offered to the engineers.

Engineers.

The Admiralty is now offering a retainer of £5 a year to stokers. No attendances at drill being required, these terms are liberal. Stokers of the reserve should be called out for duty during the manœuvres. Two or three hundred experienced men distributed through the vessels temporarily commissioned should be able to give valuable instruction to the raw hands entered at the ports. Gratuities should be paid to the reserve stokers for good conduct and intelligence in their duty as instructors of unskilled men.

Stokers.

We should not be debarred from enrolling a reserve of stokers in the Mercantile Marine by doubt as to whether the men could be spared for the Navy. On the outbreak of war a considerable number of the slow tramps would be laid up and their crews would be thrown out of employment.

Reserve of stokers in the Mercantile Marine.

II.

Naval Volunteers.

We come now to the Naval Volunteers. An excellent paper on the organisation and capabilities of this force, and the steps which should be taken to make it more efficient, was read at the Royal United Service Institution, in June last, by Mr. Chadwyck-Healey. From the date of its first enrolment, under Mr. Goschen, it may be said that the Naval Volunteer force has barely held its own. Its growth and development have not been equal to the hopes and anticipations of the earnest men at whose instance the force was called into existence, and who have since served in its ranks.

The Naval Volunteers are the successors of the Sea Fencibles. When Nelson was placed in command of the coast-defence flotilla assembled to resist the apprehended invasion from Boulogne, the Sea Fencibles formed part of the crews of the vessels. The existing force has been recruited under the impulse of the same patriotic feeling which has created and sustained the Volunteer movement in connection with the land service. It consists of four brigades at London, Liverpool, Bristol, and Glasgow. The London brigade includes batteries at Hastings, Brighton, and Yarmouth; Liverpool takes in Southport, Birkenhead and North Wales; and Bristol includes Swansea.

Opinions as to efficiency.

As to the efficiency of the Naval Volunteers, the following extracts, originally published in the *Army and Navy Gazette*, should suffice to remove doubts which have been suggested as to the services which the Royal Naval Artillery Volunteers were capable of rendering:—

Sir Walter Tarleton.

"The late Admiral Sir Walter Tarleton, K.C.B., said in his report, November, 1877:—

"'I am of opinion that the Royal Naval Artillery Volunteers would be found useful, in the event of war, in the defence of the estuaries, while in peace they serve as a connecting-link between the Volunteer movement and the Royal Navy.'

Sir Augustus Phillimore.

"Admiral Sir Augustus Phillimore, K.C.B., states in the report, November, 1878:—

"'The Naval Volunteers drill with celerity and precision, and are extremely zealous. They cheerfully conform to discipline, and are desirous of improving themselves in every way when embarked for their annual drill.'

"H.R.H. the Duke of Edinburgh, Admiral-Superintendent of Naval

Reserves, at the Royal Academy dinner, April 30, 1882 (*Times*, May 1, 1882):— **Duke of Edinburgh.**

"'The Royal Naval Artillery Volunteers are men of the civilian class, and I must say from my inspection of them that they have thoroughly well got up their drill, and that they may be looked forward to as a great support for home defence in future.'

"Lord George Hamilton (First Lord of the Admiralty), at Liverpool, June 22, 1885 (*Liverpool Courier*, July 26, 1886):— **Lord George Hamilton.**

"'I am gratified by the smart and efficient appearance which you [Naval Volunteers] present on parade. . . . . We must for the future largely rely upon local effort . . . . to co-operate with naval and military forces of the Crown should there be any imminent danger. In that case we should have to consider those who for the past three or four years have shown efficiency and who are known as the Naval Volunteer Artillery, and we have come to this conclusion,—that in order to encourage them in their duty and to increase their efficiency we ought to give them some pecuniary aid.'

"The Earl of Harrowby (on behalf of the Admiralty), House of Lords, July 20, 1885 (*Times*, July 21, 1885):— **Earl of Harrowby**

"'He had heard his noble friend (Lord George Hamilton), as well as other authorities at the Admiralty, speak in the highest terms of the patriotic exertions and excellent good work of the Naval Volunteer corps. . . . . He knew how highly they were praised by professional men.'

"Lord C. Beresford (a Lord of the Admiralty), House of Commons, March 15, 1886 (*Times*, March 16, 1886):— **Lord Charles Beresford.**

"'Considering the fact that our coast-line, without the Colonies at all, was a great deal larger than the French coast-line, he submitted that the Admiralty should organise some system of Naval Volunteers. He believed they might develop a system analogous to our magnificent army of citizen soldiers.'

"The Earl of Northbrook (ex-First Lord of the Admiralty), House of Lords, June 23, 1887 (*Times*, June 24, 1887):— **Earl of Northbrook.**

"'The modest request of the [Naval Defence] Association would cost the Government nothing, and as it was supported by competent naval authority, he hoped the Board of Admiralty would not throw cold water on a movement which, in time of war, would be of great value for the defence of the coasts of this country.'

"The Earl of Harrowby (on behalf of the Admiralty), House of Lords, June 23, 1887 (*Times*, June 24, 1887):— **Earl of Harrowby.**

"'In giving the greatest encouragement to the Naval Volunteer defence movement, he could assure his noble friend he spoke not on

his own responsibility, but after a long conference with the First Lord of the Admiralty (Lord George Hamilton). . . . . Their policy was to encourage as much as possible local exertions in this matter.'"

Increase of number possible.

The total amount provided by the last Estimates for the support of the Naval Volunteers was £6441, for an estimated number of 2000 men. It must be admitted that their number is insufficient to make the Naval Volunteers a really useful force; but it is beyond doubt possible to largely increase this number at a comparatively trifling additional cost per head to the country. When Sir Vesey Hamilton and Sir Lothian Nicholson visited the Clyde, the Forth, the Tyne, the Tees, and the Mersey in 1888, they received assurances from influential local committees that there would be no difficulty in raising an adequate number of men for the defence of the various forts, whether ashore or afloat. In the same year two patriotic gentlemen at Hull, Messrs. Briggs and Campbell Thompson, succeeded in enrolling, with the tacit approval of the Admiralty, sufficient numbers to form three batteries. Batteries could have been raised without difficulty at Goole and at Grimsby, where great interest was shown in the matter, and a Humber brigade could have been brought into existence. An offer was received to raise 300 men at Bideford, in Devon. Offers of a similar kind were received from Ramsgate, and other places. On the whole, it is no exaggeration to say that if the Admiralty had really wished it, the number of Naval Volunteers could during the years 1888–89 have been raised to at least 5000 men. To the application of the men of Hull the Admiralty replied that they did not see how any more Naval Volunteers could be usefully employed under existing conditions. Before the raising of any fresh corps was sanctioned ships must be locally provided for their use. In face of the views expressed by the Defence Committees of the Northern Ports this reply was tantamount to a direct refusal to sanction the increase of the Naval Volunteers.

The wide effect of an impetus to the Naval Volunteer movement.

It is to be regretted that the enthusiasm which prevailed in the years 1888–89, to a certain extent owing to the efforts of the Home Defence Association, was not turned to a good account. It must be borne in mind, too, that any impetus which might have been given to the Naval Volunteer movement at home would have had a far-reaching effect throughout the Empire. Bodies of Naval Volunteers already exist in New South Wales and in Queensland. The most encouraging intelligence is just to hand of the progress of the Naval Volunteer Brigade at Calcutta. The latter has received every assistance from the Indian Government; besides guns, they

have been given an old pilot-brig for headquarters, and a large steam-launch for exercise afloat. Owing to this wise encouragement the corps, though it has only lately been brought into existence, numbers 213 men. In our many ports and coaling-stations scattered all over the world, especially in places like Hong Kong or Singapore, the formation of Naval Volunteer corps would be a valuable addition to defence against hostile cruisers.

Reason for want of success.

We are brought to the conclusion that the Naval Volunteer movement has not fully succeeded, mainly because the authorities have felt that there were no definite duties which they were capable of performing in case of war, and were therefore unwilling to give encouragement to the extension of the movement. If the Admiralty desire that the force should be largely composed of professional seamen, and that fishermen and others who are unwilling to join the Naval Reserve on account of liability to serve away from home should be attracted into its ranks, we must adopt the system already in vogue in Australia, and pay the men for their drills. It cannot be claimed that the Volunteers have all the qualities of trained seamen, but they are thoroughly capable of being made seamen-gunners; they are efficient for such nautical services as are required in harbour and estuary defence, and there are many who could do duty in a seagoing ironclad.

Sphere of Naval Volunteers.

We believe that though the reorganisation of the force as a sea militia would probably lead to the retirement from the Naval Volunteers of men full of zeal, and whom we should regret to lose, it is possible to concede too much to sentiment, and that if this suggestion was acted upon the force would be better adapted for its appropriate duties in the general scheme of national defence. The Volunteers would defend the harbours, and relieve the Coast Guard in the important duty of watching the coast and transmitting information. They could replace the crews of the coast-defence vessels, who in time of war would be needed to make good the wastage in our seagoing battle-ships. They could man the torpedo-boats, which, according to the plan of Mr. Arnold Forster, might advantageously be distributed around the coast for the purposes of local defence. They could, moreover, be employed in the manner proposed by the Home Defence Association, on board specially-armed vessels, to defend our coasting trade against raiders. If the occasion should ever arise, it is certain that many of our Naval Volunteers would be found both capable and willing to take their place alongside blue-jackets on board those vessels whose operations would not be confined to home waters. One instance will suffice to bear out this last

statement. By the regulations the Naval Volunteers are not required to go aloft; Mr. Chadwyck Healey tells us that in the London Brigade at any rate this exemption is practically never exercised.

Many proposals have been made for increasing the efficiency of the Naval Volunteer force. We venture to make the following suggestions. Their senior officers should, as far as possible, be selected from the retired officers of the Navy. As with the Volunteers for the land service so with the Royal Naval Volunteers, we have not availed ourselves of the large body of officers retired in the prime of life. Liability to service should be a condition of the engagement entered into by the State for the payment of retired pay. For all duties connected with coast defence, retired naval officers would be most efficient.

Retired Naval officers employed.

Some years ago a scheme was put forward, in which the coast of Great Britain was mapped out into twelve districts, in each of which there was to be a Naval Volunteer Brigade. There are many advantages in this proposal; under existing circumstances, certain places find themselves subordinated to brigades with which they have no local connection whatever. This is especially the case with Yarmouth, Hastings, and Brighton, which are subordinated to London. At the head of each Brigade should be a Naval officer of commander's rank.

The older types of vessels should be lent as head-quarters.

To give an incentive to the formation of additional brigades, the Admiralty should hand over from the small vessels, which are becoming obsolete, a certain number for headquarters or drill purposes. We have a return of ships which will probably be removed from the list of the Navy as not worth repair in the period between the 1st of April, 1889, and the 1st of April, 1894. The list includes the following:—

Class.	Tons Displacement.	I. H. P.	Name.
Gun Vessel, 2nd Class	835	760	Ranger.
	835	810	Algerine.
	780	720	Falcon.
	610	890	Ready.
			Four.
Gunboats, 2nd Class	455	510	Firm.
	455	480	Forester.
	455	460	Firebrand.
	455	470	Firefly.
	438	530	Zephyr.
	430	430	Merlin.
			Six.

How the vessels should be prepared for the Service.

They should not be converted into hulks as was done in the case of the Frolic, now the drill-ship of the London corps. It would not be worth while to repair the engines, but even if only capable of manœuvring at a slow rate of speed the vessels would be valuable for harbour defence against raiders. A part of their obsolete armament should be replaced by guns of modern type, so that the Volunteers may not be compelled to drill, as they frequently are now, with weapons that are out of date. The possession of a ship of their own would do much to foster in each brigade that *esprit de corps* which is a vital element in the efficiency of our volunteer forces. The coast-defence ships of the Gorgon class might also be distributed to the head-quarters of the existing brigades, on board which the Volunteers should have the opportunity of drilling from time to time.

The Admiralty have been credited in some quarters with a wish to put an end to the existence of the Naval Volunteers; it is to be earnestly hoped that this is not the case. We have pointed out many ways in which they may be usefully employed. The Admiralty should not disregard any opportunities that may arise to increase the numbers and efficiency of a force which is certainly not costly to maintain during peace, and which would be invaluable in time of war, both for the defence of harbours and for replacing the men of the Royal Navy who will be called away to serve in our sea-going fleets. While other Powers have to resort to conscription both afloat and ashore, we should be careful not to damp the ardour of those who freely offer their services to their country.

Home Defence Association.

Turning to the Home Defence Association, little progress has been made on the lines originally traced for its operations. The Admiralty have made an appeal to the local patriotism of the several ports to provide a flotilla for harbour defence. In reply to a question put by Lord Sidmouth in the House of Lords, Lord Elphinstone said:

Admiralty proposal.

"In addition to the capitation grant, the Admiralty undertook to provide them with arms, guns, ammunition, and instruction, but had always, from the outset, declined to localise ships for the purpose of training these Volunteers. Their chief duty in the event of war would be the defence of the various mercantile ports. In those ports there were many small vessels, but of sufficient size to carry guns, and they were commanded by men who knew every yard of water in those parts, and those were the places where the Volunteers might be most effectually made use of. Having provided instruction, the Admiralty thought it not unreasonable to expect that the various ports should provide for the purposes of their own defence vessels on which the Volunteers could be put. It was impossible for the Admiralty to

localise men-of-war for the defence of any particular port. They must have a free hand, and must be able to send ships at any moment to any part of the world."

Rejection of the proposal.

The appeal made by the Admiralty was rejected. Led by Lord Armstrong, the great commercial communities on the seaboard have been unanimous in declining to relieve the Admiralty of responsibility. They urge that the defence of the great ports is not a merely local concern, that the prosperity of the whole country depends on keeping open the maritime outlets for our trade, and that the expense of providing such a flotilla as is necessary is too heavy to be borne by the limited number of individuals who, under a plan of voluntary subscriptions, could alone be found ready to put their hands into their pockets.

Effect of sending round the Commissioners.

While we fully concur in the contention of the Admiralty, that it is impossible to localise men-of-war for the defence of any particular port, we believe that if the Admiralty and War Office had not sent round Commissioners who proposed to practically throw the whole burden of local defence both afloat and ashore on the ports themselves, it is probable that the much more modest proposals of the Home Defence Association would have found acceptance in certain cases. At any rate, sufficient vessels would have been armed by public subscription in various parts of England to have demonstrated the feasibility of the scheme. After the visit of the Commissioners, the proposals of the Association were looked upon as part of a settled scheme of the Government to get rid of the burden of local defence, and were rejected at a large and influential meeting in Liverpool in November, 1888. Thenceforward it was useless to persevere in the effort to press on smaller ports the scheme which had been rejected in the large ports. The Association was finally wound up in May, 1889.

Practice of the United States should be followed for local defence.

In face of the declaration of the Defence Committees of the naval ports, it would be impossible to revive the scheme of the Home Defence Association with the apportionment of cost as originally proposed, and yet there is much to be said in favour of the idea of arming suitable local vessels for the defence of the coasting trade, in the same way that large merchant vessels have been armed for the defence of the over-sea trade. It is evident that only by the State can an effective flotilla be provided. We must deal with the requirements for harbour defence on the lines lately followed in the United States. The Secretary of the United States Navy provides vessels, arms, and equipment, while the several States on the seaboard undertake to raise men for a Naval Reserve Artillery and Torpedo

Corps. If in England a scheme of this nature is to be carried out in the future, the Admiralty will not only have to supply the guns and ammunition, but will have to pay a retaining fee to induce owners to fit their vessels to carry guns and to hold them in readiness for drill purposes or for service when called upon in time of war. It would doubtless be better to build special vessels for the purpose if money was readily available, but for the cost of one Pheasant at least fifty such vessels could be armed, and it would certainly be better to provide a flotilla of 100 to 200 vessels as a protection to our coasting trade against raiders, than to put our money into gunboats, which, though they may be a vast improvement on the older types, are valueless for the protection of our ocean trade.

CHAPTER V.

THE FOREIGN STATIONS.

The reinforcement of the Mediterranean Fleet, and the substitution of vessels of modern type for the older ironclads, are the most important changes of the past year in relation to the ships in commission.

Mediterranean Fleet. The Mediterranean Fleet has especially been reinforced by the sending out of the Benbow, Camperdown, and Collingwood, while the Trafalgar, Australia, and Undaunted are to follow with as little delay as possible. It has been decided that there shall be a second Admiral afloat in the Mediterranean.

French Mediterranean squadron. The French squadron in the Mediterranean has been reorganised. The division of the Levant, as a separate command, has been abolished, and a third division, consisting of ironclad ships, has been added to the evolutionary squadron. Under the new arrangements the squadron will be reconstituted as follows:—

1st Division (Vice-Admiral Dupetit-Thouars)	**Formidable, Amiral Baudin, Amiral Duperré.**
2nd „ (Rear-Admiral Alquier)	**Dévastation, Courbet, Redoutable.**
3rd „ (Rear-Admiral O'Neill)	**Vauban, Duguesclin, Bayard.**

The Channel Fleet. In our Channel Fleet ships of the latest type are taking the place of the older iron-clads. The Howe, which up to the present time has received only two out of four of her 67-ton guns, is expected to be commissioned at Portsmouth in the middle of May to relieve the Iron Duke in the Channel squadron. At the same time the Camperdown will relieve the Northumberland, and the Rodney will relieve the Monarch. With these ships and the Anson, the Channel Fleet will consist of four barbette-ships of the Admiral class, identical in size, speed, armour, and guns—each carrying four 67-ton breech-loaders. In addition, it is proposed to add at least two belted cruisers of the first class, and probably two or three smaller vessels of the Medea class.

French Northern squadron. The French ironclad squadron, Northern division, is to be reconstituted. The first-class battle-ship Hoche will carry the flag of Admiral

Gervais. The remaining ships will be two coast defence ironclads, Turenne type, or two of the Indomptable type.

On the more distant stations as well as in the Mediterranean and Channel squadrons, ships of the latest and most efficient types are gradually being sent out as reliefs to older vessels, but we have still in commission some sorry representatives of the Naval power of England. To this category belong the Raven and Swinger. On the Australian station where the distances to be traversed extend to thousands of miles, gunboats of 430 tons and a sea-speed of eight knots, cannot cruise, either under steam or sail.

Australian station.

The list of ships in commission needs constant revision to meet the new demands for the protection of trade, and new phases in the political relations of the Empire. The Australian squadron is a most important link between the mother-country and the colonies and should therefore be constituted of a few of our finest cruisers. The Admiral's flag should be carried in a ship of the Warspite type. The belted cruisers should take the place of the Gem class. The latter should be substituted for the sloops and gun-vessels.

East India station.

On the East India station, the Boadicea is not worthy to carry the flag of the British Admiral. The Hercules, the Achilles, or the Alexandra, would be suitable for the climate and more efficient for active service. The police of the seas in Burmah and the Persian Gulf should be taken over by the Indian Navy. It is desirable to reduce our strength on the East India station where the climate is enervating to British seamen, and there is much invaliding. The French have only three cruisers in the Indian ocean.

South-east coast of America and West Indies station.

The south-east coast of America should be combined with the Cape command. Small vessels might be withdrawn from the Cape, the south-east coast of America, and the West Indies or North American stations. The saving from this reduction would cover the cost of adding two ships to the training squadron, where they are greatly needed. The flag could be occasionally shown, supported by an impressive display of force by extending the cruises of the training squadron to the south-east coast of America. In the French Navy there is a strong movement in favour of a reduction of the permanent squadron on foreign stations, and the fitting out of a flying squadron.

The French have one small squadron of five ships—three of obsolete type—for the whole Atlantic.

British and French ships in commission.

The list of ships in commission under the British and French flags on the 1st January, 1890, exclusive of home and harbour-service ships, and their distribution on the several stations is given in the following table :—

Mediterranean and Red Sea.

Agamemnon.	Colossus.	Edinburgh.
Benbow.	Dreadnought.	Téméraire.
Camperdown.	Phaeton.	Carysfort.
Australia.	Scout.	Dolphin.
Fearless.	Melita.	Landrail.
Gannet.	Goshawk.	Cockatrice.
Albacore.	Hecla.	Cormorant.
Collingwood.	Polyphemus.	

Channel Squadron.

Anson.	Monarch.	Curlew.
Iron Duke.	Northumberland.	

North America and West Indies.

Bellerophon.	Pylades.	Ready.
Canada.	Tourmaline.	Partridge.
Comus.	Buzzard.	Forward.
Emerald.	Pelican.	

South-East Coast of South America.

Cleopatra.	Beagle.	Bramble.
	Flamingo.	

Pacific.

Swift.	Acorn.	Icarus.
Amphion.	Daphne.	Nymphe.
Champion.	Espiegle.	*

Cape of Good Hope and West Coast of Africa.

Penelope.	Curaçoa.	Peacock.
Raleigh.	Swallow.	Pheasant.
Archer.	Magpie.	

East Indies.

Boadicea.	Garnet.	Algerine.
Brisk.	Turquoise.	Griffon.
Conquest.	Kingfisher.	Ranger.
Cossack.	Mariner.	Pigeon.
	Reindeer.	

China.

Impérieuse.	Porpoise.	Rattler.
Leander.	Mutine.	Redpole.
Severn.	Wanderer.	Cockchafer.
Caroline.	Linnet.	Espoir.
Cordelia.	Swift.	Firebrand.
Hyacinth.	Pigmy.	Merlin.
	Plover.	

Australia.

Orlando.	Rapid.	Raven.
Opal.	Royalist.	Swinger.
	Lizard.	

* The Warspite has recently been commissioned as Flag in the Pacific.

Reserve.

Ajax.	Hercules.	Shannon.
Devastation.	Invincible.	Trafalgar.
Neptune.	Rupert.	Audacious.
Sultan.	Northampton.	

French Ships in Commission.

Mediterranean.

Formidable.	Courbet.	Condor.
Trident.	Redoutable.	Flèche.
Vauban.	Bayard.	Dragonne.
Amiral-Baudin.	Duguesclin.	Ouragan.
Amiral-Duperré.	Milan.	Agile.
	Forbin.	

Channel.

Marengo.	Océan.	Suffren.
	Epervier.	

Atlantic.

Aréthuse.	Sané.	Bisson.
Roland.	Kerguelen.	

Pacific.

Dubourdieu.	Champlain.	Saône.
	Volta.	

China.

Triomphante.	Chasseur.	Aspic.
Villars.	Vipère.	

Indian Ocean.

D'Estaing.	Bouvet.	Meurthe.
Hugon.	Boursaint.	Météore.

Vessels for coast, harbour and river service are not included.

Length of commissions.

In a former number of the *Naval Annual* the attention of the Admiralty was directed to the long period for which ships are kept in commission. The necessity for pressing this point is strengthened by the experience of the past year. The *Army and Navy Gazette* gives the following list of vessels which would have completed three years' commission by the end of 1890. Battle-ships: Agamemnon, Colossus, Dreadnought, Edinburgh, Iron Duke, Monarch, Northumberland, and Temeraire. Cruisers: Garnet, Opal, Phaeton, Calliope, Caroline, Carysfort, Cordelia, Royalist, Satellite, and Turquoise. Sloops: Acorn, Dolphin, Espiegle, Icarus, Mutine, and Swallow. Gun-vessels: Algerine, Flamingo, Griffon, Landrail, and Ranger. Gunboats: Bramble, Cockchafer, Forward, Goshawk, Lizard, Merlin,

Rattler, and Raven. Special vessels: Alacrity, Egeria, Polyphemus, and Sphinx.

Objections to long commissions.

The *Globe* called special attention to the case of the Cormorant recently paid off at Gibraltar after a commission of nearly four-and-a-half years. Long commissions are not favourable to efficiency. Men lapse into a life of routine. They are dull because there is nothing new to learn, nothing to arouse latent energies. A long commission is particularly trying for small ships on the East India Station, which spend by far the greater part of their time in the Persian Gulf, at Aden, or on the East Coast of Africa. The work of the blockading squadron has been excessively arduous, and the invaliding from some ships has been at an alarming rate.

CHAPTER VI.

Coast and Harbour Defence.

The question of Coaling Stations has of late engaged a large share of public attention. The necessity for maintaining a sufficient number of fortified outposts on the great lines of British Trade has been recognised by successive Governments, and the work of defence has, after a regrettable delay, at length been vigorously taken in hand. The points at issue between those who would rely solely on defence by naval means and those who insist on the necessity for fortifications, were summed up concisely and clearly in an article published in *The Broad Arrow*, in its issue of the 25th of January last:—

" First let us state the Naval view:—

" 1. The Naval School say that our ancestors from earliest times have placed their sole reliance for the defence of these shores on the Fleet, and the Fleet only. The addition of shore defence is quite the growth of modern times. **The Naval view.**

" 2. That this reliance on shore defence is untenable, as no fortifications can either replace or supplement such a fleet as England ought to maintain.

" 3. That such a fleet as England ought to maintain would ensure a superiority over any probable combination of enemies' ships in every sea.

" 4. That under such circumstances the only provision for shore defence should be against the probable raider.

" 5. That naval fortresses, such as Portsmouth, Plymouth, Gibraltar, Malta, Aden, Hong Kong, Bermuda, or Halifax, have no value whatever from a naval point of view, as instead of protecting the Fleet they require to be protected by it. That such fortresses must inevitably fall by blockade if not by direct attack, whilst they absorb garrisons which can be ill spared from our small Army.

" 6. That the part played by naval fortresses would be much better played by reserve fleets.

" 7. That vast sums have been wasted on fortifications which are useless and out of date, whereas if the same money had been spent

in ships we should now be in possession of a Navy equal to all the navies in the world combined.

"8. That the contrast between the sums spent on our Naval Force, which is of primary importance, with those spent on our Military Force, which is of secondary importance, is most striking.

"9. That, except as regards India and Canada, no invasion of any part of our Empire can take place as long as we retain the command of the seas.

"10. That if we lose command of the seas no fortifications will prevent it.

"11. That if we lost command of the seas England would be reduced without invasion by a simple blockade and by the destruction of her commerce.

"12. That unless the enemy had command of the seas no fleet or squadron would enter or ascend our rivers to damage our ports.

"13. That the admitted use of slight shore defence to keep off raiders is a concession to the weak-kneed, for the class of vessels that is to be dreaded will operate on a radius outside the reach of the shore guns, at a point on which all the trade of the port must converge.

"14. That on the outbreak of hostilities every enemy's fleet would be at once attacked and destroyed if it keeps the seas, or if it avoids attack would be sealed up in its own ports.

"15. That when hostilities are probable every enemy's ship would be 'shadowed,' *i.e.* carefully watched.

"16. That if this is done there can be no evasion or concentration of hostile fleets, and being superior at every point there remains no use for guns or fortifications on shore.

"Now let us consider the Military side of the question:—

Military view.

"1. Military men fully agree that the Fleet is the first line of defence, but hold that it is going too far to say that it is not only our first but our last.

"2. They consider that fortifications are valuable subsidiary means of defence, having a delaying power which would enable small squadrons to join forces.

"3. That it is not correct to say that coast defence for England is quite a modern idea. Tilbury Fort dates from the time of the Armada, when the Land Forces of England were assembled there to resist invasion. The Martello towers on the coasts of England and Ireland date from the time of Napoleon, when our naval superiority was uncontested.

"4. They say that, although undoubtedly much money has been spent on fortifications, it has not all been wasted. Forts, like wooden

ships, may have become obsolete, but during their lifetime they have answered their purpose.

"5. They think that navies, like armies, must have secure bases, and cannot follow the argument that a fleet, however superior to all probable adversaries in the Mediterranean, would of itself be sufficient protection for Malta without a soldier or a gun on it.

"6. They hold that it is not good generalship not to provide for unforeseen contingencies. The ablest general in command of the most successful army must provide for a possible check or defeat.

"7. They think that the future of naval warfare is uncertain, and, although fully convinced of the superiority of our Navy to that of any other nation, deem it possible that chance may enter into the conditions of naval combat to a greater extent than formerly. A single lucky shot from an inferior vessel may send the finest ironclad to the bottom, or leave her a helpless log on the water.

"8. They say that although a battery cannot be moved, and is only valuable for the protection of a single spot, it cannot be sunk; it requires only a few men for a garrison, and that the fire from it ought to be more reliable than that from a ship.

"9. They think that protected naval stations abroad are necessary as places of refuge for our Mercantile Marine.

"10. They think that in case of a naval war an enemy having an insignificant commerce to protect might concentrate the whole or greater part of its force in the Channel, in which case our fleets might temporarily lose their superiority, and have to take refuge under the guns of such places as Portsmouth or Plymouth until the equilibrium could be restored.

"11. They think that the lessons of the American War and the English Manœuvres show that it is impossible to prevent ships breaking out of or into blockaded ports, and therefore the superiority of one day may become the inferiority of the next.

"12. They hold that apart from their disputed naval value such places as Portsmouth, Plymouth, and Chatham have a military value. It is true that although, if the Fleet were destroyed, an enemy might land at many places on the English coast, the fortresses could not be neglected; they would have to be either taken or masked to prevent them becoming gathering points for our armies in rear of or on the flank of the enemy.

"13. They consider it a very doubtful proposition whether, if the Fleet were disabled or non-existent, England could be reduced to surrender in six months by a simple blockade and by the destruction of its commerce. As said before, they are doubtful of the efficacy of

blockade, and believe in the vast internal resources of England and her recuperative powers."

Admiral Colomb has stood forward as the champion of the extreme naval view. In commenting on his paper, *The Engineer*, in its issue of May 11th, 1889, remarks:—

Opinion of *Engineer*.

"Taking the controversy as a whole, we may observe, briefly, that in our judgment Admiral Colomb's paper was able, but too daring and sweeping to be proof against attack. The two most important principles that he enunciates, which we think deserve noting and keeping in view, may be thus expressed: (1) England must maintain her command of the sea, without this she is lost; (2) having command of the sea, she need only maintain sufficient forts to protect the coast from cruiser attack and sudden raids. This last, we think, must not be acted on without reserve; but we believe, with our system of position-finding and electric connections, we ought to defend our commercial harbours on the idea laid down by Admiral Colomb; that is, against sudden, but not systematic and deliberate attack. We think, however, that history and common sense both support the view that we can never attain such a superiority at sea as to assert that under no circumstances will any point on our coast be subject to deliberate systematic attack, calling for something more than the guns that might deal with cruisers. To have no harbour such as a division of our own fleet might fall back into if, owing to unexpected combinations and circumstances, we found the enemy temporarily stronger, would, we think, be reckless policy. Admiral Colomb grudges us even Portsmouth."

Naval ports.

Sir Vesey Hamilton.

The First Sea Lord of the Admiralty took a prominent part in the discussions at the United Service Institution on the defences of our seaports. His speech must be accepted as an authoritative expression of the views held by those now responsible for the administration of the Navy. While looking upon dependence on land defences as the policy of a weak maritime Power, Admiral Sir Vesey Hamilton was clear that our naval stations and fortresses must be defended. Forts and guns are wanted to give protection when the ships are away.

Sir Anthony Hoskins.

The relation of naval defence to defence by fortification has been clearly put by Sir Anthony Hoskins. The Royal Navy is not maintained for the purpose of affording direct local protection to seaports or harbours, but for the purpose of blockading the ports of an enemy, destroying his trade, attacking his possessions, dealing with his ships at sea, and preventing an attack in force against any special place. It is by the efficient performance of these duties that our commerce and Colonies will be better protected. Our seaports must rely for

their immediate defence on local means, leaving the Navy free to act at sea.

Compiler' opinion.

The Fleet cannot be used to advantage unless its base of operations is made secure, and every ship is available for operations at sea. It would be a mistake on the other hand to lavish large sums on fortifications which are greatly needed to strengthen the Fleet. The works and the guns for the protection of our commercial harbours must be strong enough to keep off raiders and to resist a *coup de main.* Defences of this description are comparatively cheap. Our dockyards must be sufficiently fortified to resist an attack in force until relieved by the arrival of our fleets, and it is necessary not only to fortify the naval ports, but such outlying ports as Lough Swilly, Berehaven, and Falmouth, the approaches to which would be kept open for our merchantmen by cruisers in the offing. The defence of points on the coast on which it is most probable that an enemy might attempt a landing must be made by good arrangements for the transmission of intelligence, by a judicious distribution of troops, and by an extension of railway communication.

Relative responsibility of the Admiralty and War Departments for the defence of the coast.

The line of demarcation between the sphere of action of soldiers and of sailors is a question much debated. In France, as in England, the responsibility for coast defence is shared between the War and the Naval Departments. The Naval Department undertakes to man and arm a certain proportion of coast batteries, and has a large body of Infantry who never go to sea. It has been urged that this force, together with the entire responsibility for the land defences, should be transferred in France, as it is in the French Colonies, to the War Department. In Germany the dual system has been abandoned, and the Naval Department is solely charged with the defence of the coast.

It has been alleged that the arrangements which exist in England compare unfavourably with those we find abroad. As is usually the case, we have more or less successfully overcome our defects of system by common sense and wisdom in the practical working. There is much, however, to be said in favour of making the Navy responsible for the defences of the coast. It is an anomaly to place the laying of submarine mines in the hands of men who have first to be taught to row and manage a boat. This service should at any rate be performed by the Royal Navy or Naval Volunteers.

CHAPTER VII.

Australian Defence.

In recent years the Australian Colonies have made patriotic efforts to protect their harbours and coasts. Beginning with the mounting of a few guns, the defences of the capitals of the Colonies have been gradually strengthened. Victoria has taken the lead. Port Philip, according to the statement of Admiral Fairfax, is rapidly becoming one of the best fortified places in the Empire. New South Wales has constructed considerable works for the defence of Sydney, although in armament the preparation is less complete than at Melbourne. The defences of Adelaide are not in a satisfactory condition. An enemy would experience no difficulty in effecting a landing south of Fort Glanville. A hostile man-of-war could bombard Adelaide from Holdfast Bay. Brisbane, from its inland situation at some distance up a narrow river of difficult navigation, is easily defended, and some fortifications have been constructed. The rapidly-rising coast towns of Northern Queensland, as, for example, Townsville and Cairns, have no defences.

Port Philip. Sydney. Adelaide. Brisbane.

If there is any risk to the Australian ports it must be from bombardment from the light long-range guns of some hostile cruiser. To any attempts on the part of an enemy to inflict injury by this means, the guns now mounted at Port Philip and Sydney would return an effective answer. The completion of the necessary defences elsewhere is certain to be taken in hand ere long.

Naval Defence.

A considerable flotilla for harbour defence, including an ironclad and several gunboats and torpedo-boats, has been created at Melbourne. Adelaide has a powerful coast defence vessel. Brisbane has two efficient gunboats. A Naval Brigade as well as Naval Artillery Volunteers has been organised both in Victoria and New South Wales.

Special Australian squadron.

Having made the ports secure, the Australasian Federation will doubtless devote serious efforts to the creation of a Navy prepared to act, and that not ineffectively, with the Imperial Navy in the common cause. Under a recent arrangement, for which the administration of

Lord Salisbury is entitled to public acknowledgment, and which has received the approval of the Legislatures—Imperial and Colonial—a special squadron of highly efficient cruisers has been built for the defence of the trade in Australian waters and on the coasts of New Zealand.

Military forces. The manning of the works and the general defence of the Colonies by land is guaranteed by an army of volunteers of splendid physique, well equipped and provided with a small staff of officers from the Imperial Service, animated by those patriotic sentiments which have created the admirable forces of the mother country. The growth and the present condition of these forces has been recently described in a paper read at the United Service Institution by Lieutenant-Colonel Elias. Sir William Jervois, whose interest in the Colonies is never failing, occupied the chair. To quote from Colonel Elias, besides Coast and Garrison Artillery, there are in each of the larger Colonies, Field Artillery, Engineers, Infantry, Mounted Rifles, Cavalry, and Cadet Corps. The Infantry consists chiefly of Militia, which may be called the "Regulars" of Australia. There are also Volunteers, and, in addition, there are rifle companies and rifle clubs (they are called by different names), in which men at any rate learn to shoot, although they have no regular military training. Some of these, however, become consolidated into Volunteer corps, and individual members of them frequently join the Volunteers and Militia. The Cavalry though not very numerous is of excellent quality, and as all Australians can ride is a sufficient nucleus on which to form larger bodies. A certain portion of the Artillery and Engineers are "permanent," *i.e.*, what we should call "Regulars" in this country. Finally, the police, both foot and mounted, would make most valuable troops in case of need. The aggregate strength of these forces is little short of 40,000 men.

Training of officers. In his able paper Colonel Elias made special reference to the increased efficiency of the officers. Not content with the instruction received in Australia, many have spent months at Aldershot and Shoeburyness. In Melbourne a School of Instruction for officers has been founded. Both Melbourne and Sydney possess United Service Institutes. Nothing would more conduce to the efficiency of the military forces of Australia, than the establishment of a college on the same lines as those of the military school at Kingston in Canada. In the initial stages of such an institution the mother country might render valuable aid.

Colonial Britannia's In former numbers of the *Naval Annual*, the establishment of a naval school for the Colonies on the model of the Britannia has been

recommended. strongly recommended. Many Australian young gentlemen would gladly enter the Navy, if facilities for their education could be provided within easy access from the Colony to which they belong. Some years ago a desire was expressed that a naval school should be opened at Halifax, and the Admiralty lent an old corvette, the Charybdis, for the purpose. This vessel was found to be altogether unsuitable for the work, and the attempt to establish a naval school was abandoned. There is reason to believe that the Canadian Government with effective help from the Admiralty would gladly revive their useful project.

Inspection by General Edwards. The recent inspection of the military forces of Australia by General Edwards has given a new impulse, not only to the defensive organisation, but to the movement for the federation of Australasia. In the initial steps already taken, the singular aptitute of the Anglo-Saxon race for self-government has been once more conspicuously illustrated. The propitious moment having arrived, long standing local jealousies have been put aside, and in the spirit of true patriotism the able statesmen of Australia have addressed themselves to the noble task which they have taken in hand. Under unity of administration, the military forces of Australasia will be so increased in efficiency and maintained in such adequate numbers as to remove all risk of invasion by the small forces which alone could be spared by any European power when engaged in war with the mother country. The difficulties which any Navy other than that of England would experience in obtaining a supply of coal at intermediate ports gives security to Australia and New Zealand.

England's policy justified. The progress which has been made in the defences of the great Australian ports is an ample vindication of the policy which England has pursued of encouraging the Colonies to undertake their own defence. As it has been well put by Lieutenant-Colonel Carré, R.A., "England like a wise parent teaches her Colonies to walk alone, lending them her trained naval and military officers as instructors, with promises of further advice and help, should they require or desire it. Whilst undertaking herself the defence of the seas, she entrusted them with the care of their own shores, and withdrew the last of her troops some years ago. By this arrangement the Colonies were relieved from the necessity of maintaining ships of war on the high seas, and they undertook to provide defences that were well within their means."

New Zealand. New Zealand is secured by its geographical position from an attack in force. The defence of a few principal points has been taken in hand under the able advice of Sir William Jervois. A con-

siderable body of volunteers, both for the Sea and the Land Service, has been enrolled.

As to the state of military preparation in New Zealand, Colonel Elias remarks:—"New Zealand is far enough off from the Australian Continent to be open to a separate attack, should there be any inducement to make one. Owing to the position which New Zealand occupies as an advanced shield to the principal parts of Australia, an enemy coming from the eastward might perhaps first direct an attack upon her, all the more so as defences and military matters generally are in no such state of efficiency as they are in Australia. On the other hand, when richer Australia is within reach, offering a more tempting prize, New Zealand might be left in peace.

"The New Zealand military forces are regulated by the 'Defence Act, 1886.' All male inhabitants between the ages of 17 and 55, including natives, are liable to serve in the Militia; but there is a long list of exemptions. The Permanent Militia in New Zealand, lately considerably reduced, are principally stationed at the fortifications of the large ports. The Volunteers consist of a number of small corps, an arrangement not conducive to efficiency. There is a fine body of armed constabulary numbering upwards of 800 men."

King George's Sound.

It is desirable that the necessary steps for the defence of King George's Sound should be taken in hand without delay, the Imperial Government working in concert with the Australian Governments, and giving ungrudingly their aid in providing the armaments which may be required. It is in its commerce by sea alone that Australia offers a vulnerable spot to a European enemy in time of war. In a recent speech Lord Carnarvon quoted statistics to show the importance of taking the necessary defensive measures. He said: We have three great lines of commerce between our shores and the Antipodes. In 1887, by the Suez route, some £12,000,000 worth was passing to and fro, by the Cape of Good Hope route £15,000,000, and by the Horn £16,250,000—in all, £43,250,000. What passes to and fro is partly English and partly Australian, and in one sense belongs wholly to each. King George's Sound would be the coaling port for the cruisers engaged in the protection of the trade by the two former of these routes.

Opinion of Sir W. Jervois.

Sir William Jervois said lately, "The whole question of the defences of Australasia is a naval one. The land force is really for the purpose of manning the works necessary for the protection of the ports, and for the defence of these works. There is a tendency to create new forces which really are not necessary for the pro-

tection of these countries. Forces are established in the interior which could not come into play for the purposes which we are now discussing. Of all places in Australia, South Australia depends upon naval defence the most. It is very important that King George's Sound should be properly protected. There should be guns mounted in the best positions, and there ought to be a separate and efficient garrison provided at the Sound. If not so defended it affords an admirable point whence any hostile naval force could operate against your commerce. Thursday Island should be fortified in a manner similar to King George's Sound, in order that we might secure that end of the continent. In this way you would have the approach to Australia from the south-west and north-east and east secured by means of points from whence the naval squadron could act for the general protection of the colonies. Port Darwin, however strongly defended, would not influence the defence of Torres Straits directly. But at Thursday Island you could absolutely secure the channel against the passage of a hostile ship."

After considerable negotiation it has been decided that Thursday Island and King George's Sound shall be fortified with assistance from the Imperial Government. Garrisons of Marines were originally proposed. It is now the wish of the Australian Colonies to furnish garrisons from their permanent forces.

Port Darwin.

It has been officially communicated by Lord Knutsford to the Government of South Australia that it is not considered necessary to fortify Port Darwin. As the landing-place of the cable by which Australia is placed in telegraphic communication with the rest of the world the position is important, and when the railway projected to connect it with Adelaide is completed the position will acquire additional importance. It may be presumed that the Local Government will undertake the responsibility for the construction of defences for Port Darwin.

CHAPTER VIII.

Coaling Stations.

Classification of coaling stations.

In determining the amount of local defence which should be given to the coaling stations, it is necessary to classify them in the order of their importance. My late and much lamented colleague-in-chief, Sir Cooper Key, contributed an able paper on this subject to the *Nineteenth Century*, in August, 1886. The positions of the highest strategical importance and which are held as naval stations for the repair and equipment of ships of war, and also as *places d'armes*, should be made capable of standing a siege until the arrival of our fleet in their support. In this category would be included Gibraltar, Malta, Aden, and Hong Kong. Coaling stations come second in importance, though we depend on them for the refit of the fleet. In this class may be included Ceylon, Singapore, Mauritius, Sierra Leone, and St. Helena. These ports, in the view of Sir Cooper Key, should be so defended as to be independent of the presence of the fleet, which must always be free for offensive operations and for the protection of our trade on the high seas. The permanent self-defence should be sufficient to deny anchorage to an enemy. This protection can be best afforded by submarine mines guarded by guns, for the most part of 6-inch and lighter calibres, placed at heights of not less than 100 feet above the sea level, and mounted on disappearing Moncrieff carriages surrounded by a ditch.

We may now proceed to consider how far the work of defence has been advanced to the level of our requirements on the several stations. The recent inquiry by a Royal Commission resulted in the publication of an exhaustive report, first published as an Appendix to the Blue Book on the Colonial Conference. From this source the present chapter has been compiled.

As the groundwork on which their recommendations were based, the Commissioners brought together the leading statistics of our trade. They estimated the value of British ships and the freights they carried annually at £900,000,000, British property to the value of

£144,000,000 being at all times afloat, and the greater part on distant voyages. Broadly, the foreign trade of the Empire may be divided into two great divisions, the trade with the Americas, and that with the Mediterranean and the East by the Canal and the Cape. Defended coaling stations are required chiefly for the protection of trade with the East, and need of them becomes more apparent when we note the increasing tendency of commerce to make use of steamers. On the great trade route by the Suez Canal to our Eastern possessions and to Australia, steamships have entirely superseded sailing ships. Under the new conditions the possession of a continuous chain of coaling stations gives England an advantage which it is imperatively necessary to maintain.

Two great trade routes.

Taking the several coaling stations on the Eastward route in geographical order, we begin with Gibraltar and Malta.

Gibraltar and Malta.

In former numbers of the *Naval Annual* little has been said as to the defence of Gibraltar. It was assumed that, the Government having withdrawn this fortress, and that of Malta, from the purview of the Royal Commission on the Defences of the Coaling Stations, had assumed a responsibility to which no Minister would venture to be unfaithful, and which Treasury considerations would never be allowed to fetter. The great fortresses of Gibraltar and Malta are maintained wholly from resources provided by the Imperial Exchequer. Improvements in their defences have been in hand ever since they came into our possession; the ceaseless advance in gunnery demanding corresponding extensions of the batteries and constant changes of the armament. The vast increase of range in modern naval guns has made it imperatively necessary that fortresses should be armed with guns of corresponding range, without which no reply could be made to the attacks of a feeble enemy.

The position of Gibraltar in relation to the general question of Imperial defence is discussed by Sir Charles Dilke, with his never-failing lucidity and abundance of information, in his recent volume entitled *Problems of Greater Britain.* I entirely concur with the views he has expressed.

Gibraltar is being much strengthened and improved. Two 100-ton guns have been mounted, one in the Alameda and the other nearer Europa. Batteries are being constructed in elevated positions. Guns are being mounted which command not only the anchorage but the Eastern sea, and sweep the Rock in all directions. The summit of the Rock is being fortified, so that if a landing were effected the ground could not be held. For the improved methods of mounting guns on the disappearing system, which have been exten-

London. Stanford's Geog.l Estab.t

sively adopted by the Italians, Gibraltar offers many suitable positions. The system offers great advantages in economy of material, time, and cost. Grüsom's cupolas, or armoured shields, have as yet received little attention, while no adequate provision has yet been made for arming our fortresses with the quick-firing guns, which have so greatly added to the powers of defence.

Want of a graving dock and better coaling arrangements.

Gibraltar requires considerable improvements, with a view to increased facilities for giving succour to the Navy in case of war. The coaling arrangements are inadequate, and no graving dock exists. An extension of the new Mole is required, both for the stowage of coal and the more expeditious coaling of a squadron. The stone required for the breakwater could be excavated from a position adjacent to the present dockyard, and admirably suited to be the site of a graving-dock. The cost of work could be spread over a term of years. It is essential to the equipment of Gibraltar as a coaling station.*

Docks at Halifax and Esquimault.

Thanks to the untiring enterprise of the country, the British Admiralty are enabled to obtain many resources of the Navy at a minimum cost to the taxpayer. Docks have been extensively provided in important positions by private companies, aided by moderate subsidies from Government. In Halifax a dock capable of admitting any vessel in the world has recently been opened—length, 580 feet; width at top, 102 feet, and at bottom, 72 feet; depth over sill, 30 feet. The width was chosen to accommodate H.M.S. Inflexible, which has a beam of 75 feet. The entire cost was about a million dollars. The money was furnished by an English company, who are to receive subsidies of 10,000 dollars a year for twenty years from the City, the Dominion, and the Imperial Governments respectively. Crossing to the Pacific shores of the Canadian Dominion, we learn from the *Army and Navy Gazette* that the Admiral has recommended the enlargement of the dock at Esquimault, so as to accommodate the largest vessels of the Navy. The existing dock has been of great service for the repair of H.M.S. Amphion.

Malta.

The compiler can contribute nothing from personal examination with reference to the state of defence of Malta. There is no reason to fear that this important station has been neglected by the Government.

Aden.

Passing through the Suez Canal, we find at Aden another commanding position. Aden may be compared to a huge cinder, standing isolated on the sandy shores of Arabia. The Royal Commissioners

* Since the above was written, the construction of a dock has been authorised.

insist strongly on the strategical importance of the station. The distance from Suez is 1300 miles; from Mauritius, 1970 miles; from Bombay, 1637 miles; and from Ceylon, 2130 miles. Aden is an important coaling station in peace for ships using the Suez Canal. In war it would be the only place in our possessions from which our Fleet could prevent foreign ships that had passed through the Suez Canal into the Red Sea from gaining access to the Indian Ocean. It is evident that the loss of this commanding position might be a grave danger to British interests throughout the East. The Royal Commission urged strongly that Aden should be secured against the attack of a small squadron. The Government of India, of which Aden is a dependency, are not likely to neglect so important an outwork.

Bombay.

Bombay is at once the greatest place of trade in India, and the base on which our naval operations in the adjacent seas must depend. The harbour is defended by batteries, and by two armoured vessels. Its geographical position secures it from attack by a powerful European force. Holding that maritime superiority, which is the vital condition of our existence as a nation, the passage to the East by the Canal should be denied to any hostile fleet. Without the means of coaling at intermediate ports, it would be impossible for an enemy's steamers to make their way from Europe to India round the Cape under steam. To capture such coaling ports as were in the hands of an enemy would be the first operation of offensive defence for the British Navy. Taking these considerations into view, Bombay has been recently declared by that able officer, Sir Frederick Richards, the last Naval Commander-in-Chief on the East Indian Station, to be sufficiently secured against any probable attack.

Large dock for ironclads necessary at Bombay.

It would be easy to expand the Government dockyard at Bombay to meet the sudden exigencies of a state of war. The want of dock accommodation is the main deficiency of Bombay as a base and port of refit for the Fleet. The largest dock at Bombay, which belongs to the P. and O. Company, with a length of 415 feet, and a breadth of 67 feet, has only 18 feet on the sills in ordinary springs. It is, therefore, inadequate for ironclads, and even for merchant steamers of the first class. The need for a larger dock has again and again been pressed on the Government of India. This requirement has at length been met by the action of the Bombay port authorities, who have the enviable advantage of a revenue of 2,500,000 rupees in excess of expenditure. A concession has been given to Mr. James Bowack for a dock, described in *Engineering*, which will have a

length of 600 feet, a breadth of 65 feet, and the necessary depth of water. The site selected is in the centre of Bombay harbour.

Kurrachee.

Turning northwards from Bombay we have in Kurrachee a port of immense importance as a base for the military defences of the north-west frontier of India. As compared with Bombay, Kurrachee is nearer to England by two days' steaming. In the distance by land to Peshawur there is an advantage in favour of Kurrachee of some 600 miles. By skilful engineering, the entrance to the port, the anchorage, and the wharfage have been adapted to the requirements of steamships of large tonnage. The defences both by batteries and torpedoes are well advanced.

Ceylon.

Descending from north to south along the western shores of the great Indian peninsula, we arrive at the beautiful island of Ceylon. Here England is fortunate in holding another valuable link in the chain of communication with the East. The distance from Ceylon to the Cape of Good Hope is 4400 miles, to Mauritius 2100, to Aden 2130, to Bombay 960, to Singapore 1510, and to King George's Sound 3400 miles. If measures were taken to prevent an enemy's ships from coaling in adjacent seas, Ceylon would be comparatively safe from heavy attacks; the possibility of the appearance of a hostile cruiser must however be admitted. The Commissioners on the defence of coaling stations carefully weighed the relative advantages of Galle, Colombo, and Trincomalee. Galle, for many years the port of call for the mail steamers, has gradually been abandoned in favour of Colombo. The latter port is better situated for the purposes of trade, it has railway communication with the interior, and is near a rich and fertile district. A commodious harbour has been for years in progress, and it is already sufficiently advanced to afford well-sheltered anchorage during the south-west monsoon. For local reasons, no less than Imperial considerations, the Royal Commission held it necessary that Colombo should be adequately protected both by floating defences and by batteries on shore. In 1878 hasty efforts were made to repair the fortifications erected by the Dutch, and a few guns were mounted. A considerable expenditure has recently been devoted by the Imperial Government to the fortifications.

Trincomalee.

Trincomalee is on the north-eastern side of Ceylon, about 270 miles from Point de Galle; it is the safest and most commodious harbour in the Indian Ocean and easily defended. The anchorage is within a spacious land-locked bay containing 1800 acres of deep water, while the principal entrance is only 500 yards wide. This splendid harbour first attracted the attention of the Dutch, and ever

since the British occupation of Ceylon in 1796 it has been used by the Royal Navy. Being, as it has already been said, out of the course of trade, and with no facilities for the repair of ships such as are now to be found at the great places of trade in the eastern seas, the Commissioners do not recommend a large expenditure on fortifications at Trincomalee.

Colombo.

As to the progress made in arming the new works at Colombo, the following information is taken from the *Engineer* of the 1st November, 1889 :—"Within the last few weeks one of the five 7-in. rifled muzzle-loading guns required for the new batteries at Colombo, Ceylon, has been shipped, while the remaining four are now almost completed and ready for proof. But such is the pressure of work on the proving ground, that this—almost more than the demand on the manufacturers—gives rise to the delay experienced. This is particularly the case as to the larger weapons, and there is little prospect that the four 9·2-in. guns forming the balance of the armament required for Colombo can be ready for shipment within the current year. It is now at least six months since the new batteries at that important harbour and coaling station were completed; but the Colonists may consider themselves fortunate if they receive the artillery required for them within twelve months of their completion."

Suggestions for manning the works.

When the fortifications and guns are provided the means of defence will still remain incomplete without a sufficient force of artillerymen to man the works. A volunteer force, of whom a limited number are Europeans, has been raised at Colombo; the local police force numbers 1500 and is largely composed of the Malays, who make efficient soldiers when well commanded. A mixed corps of Europeans and natives should be organised at Colombo similar to the volunteer artillery already enrolled at Bombay, from which detachments should be sent to Trincomalee when necessary.

Singapore.

Continuing the voyage eastwards, Singapore is our next important position. It guards the southern end of the Straits of Malacca, the main entrance to the Indian Ocean from the eastward. Holding an advantageous geographical position, with a fine natural harbour, and under a liberal fiscal policy, Singapore has become an active commercial centre. The population, numbering over 100,000, is chiefly Chinese and Malay. The value of the imports and exports exceeds £8,000,000. In 1884 the quantity of coal supplied to passing steamers had already reached a total of 15,000 tons a month. The entrances and clearances at the port of Singapore aggregate a total of over 8,000,000 tons a year. Capacious docks have been

constructed with all modern appliances for repairs. The Dutch men-of-war on the naval station in the Eastern Archipelago resort to Singapore for all important repairs. From its commanding position on the highway for steamers to the furthest east, Singapore should certainly be regarded as a naval position of first-class importance.

The Colonial Government has carried out an extensive scheme of defence planned by officers of the Royal Engineers. Progress has been made in the supply of guns. Some 8-inch steel breech-loaders have been sent out, but a not inconsiderable proportion of the guns recently mounted are reported to be of older pattern. The present condition of the armaments is, in the opinion of the Admiralty, sufficiently satisfactory to justify the withdrawal of the Orion, which had been temporarily detached from the Mediterranean for the defence of Singapore and its harbour. The stationary torpedo defences are complete. Defences of Singapore.

The approaches to Singapore, being for many miles through narrow seas, a numerous flotilla of torpedo-boats would offer an effective defence from the attacks of a squadron of heavy ships. Perhaps in no part of the world could a position be found more adapted than that of Singapore for a floating torpedo defence. A liberal appropriation of our second-class boats should be made. The powerful boats capable of holding their own in a seaway which we need for the English coast are not required at Singapore. Value of torpedo boats for defence of Singapore.

It may here be remarked in passing that torpedo-boats should be distributed more liberally to all the coaling stations. We have a considerable number which are only fit for harbour defence.

The question of manning the works must be dealt with. The Local Government have a splendid battalion of 1000 Sikh police who could be trained to work the guns, and would most usefully supplement the scanty European force. The Imperial Government should organise a battalion of 1000 Sikh gunners with a regiment of Malays armed with rifles for scouting duties. In view of the great objections to the maintenance of large garrisons of English troops in tropical climates, in which their health and fighting condition must rapidly deteriorate, the selection of a depôt in a temperate latitude, from which reinforcements could be promptly sent forth when necessary, presses for consideration. The compiler would suggest Tasmania, or still better Albany, as a possible base for the reinforcement of Singapore and Hong Kong. It must be admitted that the position may not be sufficiently near to meet the demands of Colonel Maurice. In his essay on the balance of military power, he insists that our Suggestions for manning the works. Compiler's suggestion of a base. Colonel Maurice.

coaling stations and harbours shall be adequately armed and garrisoned, and that the garrisons of our distant stations beyond sea shall be permanently maintained there; because war breaks out always with such startling rapidity that garrisons not on the spot are useless, while our Foreign Office will, beyond all doubt, resist, as a matter of diplomatic prudence, reinforcement on the eve of war, even if war had a really long "eve." He holds that the only time when we can garrison Hong Kong, Singapore, and the like, is during profound peace.

Hong Kong.

Our chain of coaling stations along the line of communication to the furthest East terminates at Hong Kong, the chief centre of the British trade with China, and the only British position from which that trade can be defended. Its picturesque aspect and great commercial importance have recently been described in a paper read at a meeting of the Royal Colonial Institute by Mr. Keswick, a leading merchant long resident at Hong Kong.

Mr. Keswick's description of the island.

"The importance of Hong Kong is not to be estimated by its extent in acres, by the miles of its circumference, by the fertility of its soil, which is disintegrated granite; by its agricultural productions, of which there are none, but by the commanding position the island occupies in the China Sea, on the coast of the Kwangtung province, and at the mouth of the Canton river. It is distant about forty miles from the Portuguese Colony of Macao, and ninety miles from Canton, the southern capital of China, and as it lies between 22 degrees north latitude and 114 degrees east longitude, it is just within the tropics. The length of the island is about eleven milés, and the breadth varies from two to five miles, whilst its circumference is about twenty-seven miles. It consists of a broken ridge of lofty hills, the highest being Victoria Peak, 1890 feet, with but few valleys of any extent, and very little ground is available for cultivation. Its harbour is one of the finest and most beautiful in the world, the area of it being about ten square miles."

As a seaport.

Having touched upon the countries with which trade connections exist, Mr. Keswick proceeds as follows: "I would now call your attention to Hong Kong as a shipping port; and in doing so would remind you that it is not yet fifty years since we first made use of the anchorage. Its position could not have been more excellently placed on the coast of China if human design had conspired to place an admirable harbour in the China seas, which should command, from its accessibility and convenience, the maritime supremacy of the far East. Being a free port, and affording every convenience for quick despatch, it has become the great centre of shipping, the terminus of many mail

lines, and the junction from which new departures are taken. Vessels arriving from and proceeding to other countries, not only make it a port of call, but find in it one of the chief places for the discharge and receipt of cargo, and for the landing and taking up of passengers. For foreign trade it has become the port of Canton, and for the great and growing coast traffic and native trade with North and South, and with Tonquin, Saigon, Siam, and the Straits Settlements and India, it is the emporium. It is so admirably situated, too, for the native junk and boat traffic with the populous mainland, with its innumerable bays, inlets, and small ports, that it has become a great distributing centre, and no more marvellous growth has anywhere taken place than in the native junk tonnage frequenting the harbour, which amounted in 1888 to 1,864,000 tons."

Statistics. The tonnage of foreign vessels in 1888 reached the great total of 6,400,000, and the present Governor of the Colony, Sir William des Vœux, states in a very interesting publication: "The tonnage return of Hong Kong shows it to be the third port of the British Empire, and, therefore (with the possible exception of New York, of which I have no statistics), the third of the world. The aggregate burthen of shipping is greater than that of all the British possessions on the Continent of America, or than that of the four leading Colonies of Australia."

Graving docks. The distance from Hong Kong to Singapore is 1440 miles, to Saigon 940 miles, to Shanghai 800 miles, and to Yokohama 1560 miles. The anchorage is secure. The graving-docks, subsidised by the Admiralty, in the hands of commercial companies, are capable of receiving iron-clads of the largest class which will be seen in the China seas. During their war with China, the French ships of war made Hong Kong their port of resort for all important repairs. M. Weyl has stated in an article quoted in the *Naval Annual*, of 1887, that the work executed at Hong Kong for the French Navy was carried out as easily as in the great harbours of France. This was far from being the case when the French were compelled to fall back on the limited resources of Saigon.

Manning of defences. It will be obvious that Hong Kong is a naval station of the highest importance. Its defences are now being made good at the cost of the local and Imperial Governments. Although, as it is stated in the *Army and Navy Gazette*, a few 6-inch guns have been mounted, Lord Carnarvon has recently felt himself justified in remonstrating on the insufficiency of the armaments of Hong Kong, especially in guns of the more powerful calibres. At Hong Kong the arrangements for the garrison necessary for manning the defences are not yet matured. As Sir Charles Dilke justly remarks, an unwarrantable delay has been

allowed between the decision that a battalion of Sikh gunners is necessary, and its creation.*

In addition to the land defences the Wivern has been permanently stationed for the defence of the harbour.

Cape of Good Hope route to the East.

Having followed the line of communications by the Suez Canal, we turn to the alternative route by the Cape of Good Hope. The strategical considerations to which the Commission on the Coaling Stations called attention lend a special importance to the Cape route, quite apart from the facilities which it might afford to commerce. The Cape route is essential to the retention by Great Britain of her possessions in India, Mauritius, Ceylon, Singapore, China, and Australasia. It is by this route that reinforcements of troops and necessary supplies could in the contingency of war be despatched to the East with the least exposure to capture.

Sierra Leone.

The distance from England to the Cape is 6000 miles. The intermediate coaling stations in time of peace are Lisbon, Gibraltar, Madeira, St. Vincent, Sierra Leone, and Ascension. Lisbon, Madeira, and St. Vincent being in foreign territory, Sierra Leone is the first coaling station on which we can rely after passing the parallel of Gibraltar. The harbour is capacious and secure, and a considerable trade is carried on with the neighbouring tribes. Works of fortification have been recently completed.

Ascension.

Pushing to the southward we come to Ascension. The distance of Ascension from Sierra Leone is 1000 miles, from St. Helena 680 miles, and from the Cape of Good Hope 2380 miles. The island is eight miles long and seven broad; it has no harbours, and the roadstead or landing-place on its western or leeward side is exposed from time to time to heavy rollers, making communication with the shore impossible. Ascension is entirely under the control of the Admiralty. The depôt of stores and coals for Her Majesty's ships to the value £50,000 should be secured from the risk of destruction by a light cruiser.

St. Helena.

We pass on to St. Helena. The importance of this beautiful and interesting island has gradually diminished since the opening of the Suez Canal. While the improved coal endurance of steamers tends to make frequent coaling unnecessary, St. Helena is still of great value as an intermediate point between Cape Town and Sierra Leone, and a health resort for the fever-stricken crews of our ships stationed on the West Coast of Africa. In the opinion of the Royal Commission on Coaling Stations St. Helena has many advantages

* The raising of this battalion has been sanctioned as we are going to press.

over Ascension. It is larger, has a cooler temperature, more vegetation, and a better roadstead. Fresh provisions are cheap and abundant. With a population of some 6000, which number, however, is tending to diminish, a local militia could be raised to assist in manning the defences. The former local force of Fencibles should be re-established, and some African troops should be introduced to supplement the European force. At different periods, notably when the Emperor Napoleon was a prisoner in the island, and subsequently, considerable fortifications have been erected. It having been decided to further strengthen the defences and to supply a modern armament, two batteries, to be armed with 9-in. breechloading guns, and another battery armed with 7-in. guns, have been completed at a cost of £10,000. The anchorage in St. James's Bay is easily defended. The breaking seas on the windward side of the island make landing impracticable except at a few points, which are easily commanded by guns.

Having referred to the defences in progress at the intermediate stations, the Cape will now engage our attention. The first report of the Royal Commissioners gave statistical returns showing that the value of British trade either with, or which passes round, the Cape of Good Hope, amounted to £91,352,000 a year, the whole, with the exception of about £4,000,000, being carried on directly with the United Kingdom. The *Engineer* of April 5th, 1889, gives some interesting information on the growing importance of British interests in South Africa. The Cape Colony has an import and export trade of nearly thirteen millions sterling, almost exclusively with Great Britain. For 1600 miles of railway completed a dividend of 4¼ per cent. is earned. The extension of the railway system from Kimberley to Delagoa Bay is sure to be accomplished at an early date, and will add largely to the revenue. The annual value of the trade of South Africa, of which Cape Town may be regarded as the principal emporium, was £11,000,000, while the passing trade to Mauritius, India, China, and the East, amounted to £59,000,000 and that to Australia, which was almost entirely outward from England, amounted to £21,500,000. Enormous, however, as was the value of this trade, it by no means represented that which, in the event of war with one or more of the great naval powers, might pass round the Cape. The annual value of the British trade with India, Ceylon, China, and the East, conveyed through the Suez Canal, fell little short of the trade by the Cape route, and the route by the Suez Canal might in certain circumstances be exposed to interruption by an enemy.

Cape of Good Hope.

Value of the trade.

Danger of Suez Canal route.

The route up the Mediterranean, 2000 miles in length, passes within gunshot of harbours which might be in the hands of enemies. In the pages of the *Nouvelle Revue* Commandant Z. insists on the importance of Corsica and Bizerta as strategical positions. Of Bizerta he remarks that a squadron stationed at that point could cut off the communication with India by Suez. Not to take advantage of such an incomparable position is in his view a grave act of neglect, for which the present rulers of France, ministers and members of Parliament equally, will be held responsible when the verdict of history is pronounced. It is necessary to observe that neither at Bonifacio nor Bizerta have any works of fortification been as yet undertaken. If the long sea route became the only one available, the annual value of the trade by the Cape would amount to £150,000,000, exclusive of the shipping employed.

Topography of the Cape.

The Commissioners gave a minute description of the Cape, and of the defences which would be required. The Cape peninsula, about 32 miles in length in a north and south direction, is a rugged and mountainous district, connected with the continent by a low isthmus about thirteen miles in length, dividing Table Bay on the north from False Bay on the south. Simon's Bay affords a secure anchorage, and on its shores our naval establishments have been formed. Mercantile operations are concentrated wholly at Cape Town. The anchorage in Table Bay, the scene of many disasters in former days, has been rendered secure by a noble breakwater extending out for a distance of over 3000 feet, and protecting between thirty and forty acres of the Bay from the severest winds. Excellent dock accommodation exists at Table Bay, the largest graving dock being 500 feet in length by 70 feet in breadth, with 26 feet of water over the sills. The position of these docks is just within the shelter of the breakwater. The coal depôts are in the same situation. To make the Cape thoroughly secure it is necessary to fortify both Table Bay and Simon's Bay. The permanent works at the latter place have been remodelled, and are to have 9-in. and 10-in. guns, muzzle-loading.

Progress of defence at Cape Town.

The statement made by General Smyth, Administrator of the Cape Colony, in his speech at the opening of the Parliament in Cape Town, is satisfactory with regard to the progress of defensive works. He said the defensive works on the shores of Table Bay, provided for from the Colonial funds, were in an advanced stage, and would be completed next year. An extension of the railway to Simon's Town was also promised, and authority would be asked to extend the harbour works in Table Bay at Colonial expense, to afford shelter to

ships of the Royal Navy and to coaling vessels. The extension of the railway from Cape Town to Simon's Town would be of great advantage to the dockyard and ships at Simon's Bay. Some 6-pounder Hotchkiss quick-firing guns are under orders for this station.

Ample means are forthcoming in the Cape Colony for the provision of garrisons to work the guns and man the various defences. There are 1500 local mounted riflemen and police, all excellent and practised shots, with eyes accustomed to aiming drill; a corps of trained volunteers, 4600 strong, and ample reserves of able-bodied colonists, who would come out to a man at the first alarm of war. **Men for manning the works.**

When the works now in hand are completed, the coaling station and harbour of the Cape of Good Hope will be secure against an attack by such a force as would be likely to be despatched to these distant waters.

Mauritius is the connecting link lying nearly midway between the Cape and India, which are separated by a distance of 4440 miles. In the wars of the last century the island formed the base from which the French expeditions were sent forth to attack the British settlements at Madras. The capture of the island was considered essential for the defence of India. At the present time, no less than in the past, the loss of this position would be a disastrous blow. It is essential, therefore, that it should be sufficiently defended by well-manned works against a *coup de main*. The attack of an armada would be warded off by naval operations. As a port of call Mauritius has suffered considerable loss from the opening up of the Suez Canal. It is still prosperous, having a revenue of £700,000 a year and a trade of the annual value of £6,000,000. The chief exports are sugar; the chief imports, wheat and rice. In its secure and commodious harbour, Mauritius has a conspicuous advantage over the neighbouring French Island of Bourbon. The Royal Commission recommended additions to and improvements of the existing defences, which have been taken in hand. **Mauritius.** **Its revenue.**

It is reported to be in contemplation to increase the garrison to a strong battalion of infantry and three batteries of artillery, one European and two Asiatic. Looking to the considerations of climate, it might be well to strengthen the force at the Cape sufficiently to provide for throwing a reinforcement into Mauritius.

Having dealt with the British trade with the East, we turn to the West. The trade with the United States and Canada exceeded at the date of the Report of the Commission on Coaling Stations **Atlantic trade.**

£119,000,000 in annual value, of which a large proportion is food and raw material supplied to the United Kingdom. A war with the United States cannot be contemplated by practical British politicians. In the event of a conflict with any other power, English steamers would require protection near the coasts at either end of their voyage. The matchless speed of Atlantic liners will insure their safety in the open ocean.

The British trade with the West Indies amounts to £21,000,000 annually. The defence of this important trade rests in Jamaica and St. Lucia. The defences of Jamaica have been modernised and greatly improved in recent years. St. Lucia has recently been selected by the Admiralty as a coaling station for the fleet in the Windward Islands.

CHAPTER IX.

Dockyards and Gun Factories.

In the present chapter it is proposed to consider the much debated question of the efficiency of our Naval Administration. It is impossible that Parliamentary and non-continuous administrations can compare in vigour and economy with personal and continuous management. Under one aspect or the other results are always less perfect than we could wish. If the workmanship is of undeniable quality, the work is perhaps too slow or too costly. If the cost is reduced, the workmanship may be defective. Defects inherent in the circumstances are frequently attributed to defective machinery. Every committee recommends a reorganisation, of which the only sure result is that some fortunate individuals will receive handsome additions to salary, and that less favoured veterans will be condemned as obsolete, and pensioned off to make room for the promotion of new men. It is one of the main difficulties of public administration that motives of self-interest can seldom be called into play to stimulate exertion. Prompt promotion for specially meritorious efforts—promotion resting on personal knowledge of the practical efficiency of men rather than on the illusory test of a paper examination—is the only means in the hands of the Admiralty of stimulating energy. Assurances have recently been given that promotion for effective practical service will be more frequent in the future.

Question of efficiency in English dockyards.

The results of reorganisation.

Having regard to the inherent defects of which we have spoken, it does not appear desirable to increase the dockyard establishments. It is interesting to compare the denunciations of the policy which led to the closing of the dockyards of Deptford and Woolwich with the pressure now being put on the French Admiralty to close at least one of the French dockyards. As to the quality of workmanship, if we not rarely fall short of perfection ourselves we have little to fear from a comparison with our neighbours.

It has been our duty in previous chapters to refer to criticisms which have been passed upon certain types of the British Navy. The defects brought out in the course of severe trials

Work in English and French yards compared.

can, as it has been shown, without difficulty be remedied. It would be an injustice to the British Naval Administration if an impression were created that similar defects are never discovered in the ships built for foreign powers. In the French Navy the cruisers have shown serious weakness of structure, and forced draught has been injurious to boilers. In the English dockyards 17,000 men earn on the average £68 a year. In the French dockyards 21,000 men earn an average annual wage of £40. Under our system the time occupied in building ships is less than half the period occupied in France. In point of cost of building the two countries seem to be nearly on a level.

United States.

In the United States the execution of work in the contractors' yards is not dilatory; but the cost compares far from favourably with our own yards. *Engineering* gives the following figures:—

The turret-ship Maine cost £517,650, and the cruiser Texas £495,000. Our most powerful cruisers, Blake and Blenheim, are to cost only £368,000, while the dearest of the belted cruisers of the Australia class cost only £284,550; other vessels of the same class having been built for £260,000. The remarkable protected cruiser Reina Regente, built rather more than two years ago on the Clyde for the Spanish Navy, a vessel which for speed and general efficiency has scarcely been excelled by any others of her type, was produced for £250,000, or not much more than one-half the cost of one of the American vessels. Coming down to the smaller class of cruisers, it appears that the Baltimore cost £210,000, Philadelphia £260,000, San Francisco £270,000, and Newark £250,000; while corresponding vessels in the British Navy cost from £145,000 to £223,000.

On the whole the country should be well content with the Royal yards. The vigilance of Parliament and the public has not been bestowed in vain. Certain it is that without that ever-present sense of the public watchfulness, which now happily exists, we should have had more cause for dissatisfaction. If the salaried establishments in the Royal yards are in excess of what would be found in a commercial establishment, if the general or indirect charges in the dockyards represent 20 per cent. of the expenditure as compared with 10 per cent. in contractors' yards, it may reasonably be pleaded that this difference is fully accounted for by the special requirements of naval establishments. We must always be ready in peace to meet the emergency of war.

Salvage of the Sultan.

In the salvage of the Sultan we have an exceptional instance of a work of difficulty undertaken by a foreign contractor for the British Navy. A tribute of praise is due to the men who are so justly

entitled to receive it; all the more so because they succeeded in an enterprise which Englishmen did not even care to attempt.

Receiving ships to be sea-going ironclads.

A wise step in the reduction of unprofitable expenditure has been taken in the past year. At Portsmouth, Plymouth, and the Nore, the Admiral's flags will be transferred to their respective yachts. The receiving ships will be sea-going ironclads. The Nelson is to be used for this purpose at Portsmouth, the Black Prince at Plymouth, and the Northampton at Sheerness. At Queenstown the Triumph will replace the Revenge, which will be moored into the Clyde as a school-ship. The gunnery establishment at Portsmouth will be removed to Whale Island. At the Western port the Cambridge cannot long be retained for instruction in modern gunnery.

Guns.

The gun question has presented immense difficulties both in relation to pattern, and the resources for manufacture. On their first introduction into the service we had failures of the lighter breech-loading guns. More recently we have had failures of the heavy guns on proof, and instances of disablement by bursting and rupture. Our gun construction has shown itself to be faulty in the essential element of endurance. The present condition of our guns is ably summed up in an article published in the *Engineer*. Large charges and low but sustained pressures ruptured the guns at the muzzle. The use of slow-burning powder has been the cause of new difficulties. It is liable to changes from heat or fracture of grain, and to exert a more violent strain than the guns are constructed to bear.

The unprofessional mind examining the gun question without prejudice or partiality, can scarcely fail to be brought to the conclusion that as in the ship so in the guns, the failure, so far as it exists, is due to the attempt to obtain too much work out of the guns in proportion to the weight of metal. With reduced charges the safety and endurance will be increased, while the penetrating power and the range will be ample for all practical purposes. If the aim be true the blows will be deadly and destructive.

Designs of guns for the Navy.

For the designs of the guns of the Navy, the responsibility rests with the Ordnance Select Committee,—a changing body, and combining in its constitution both military, naval, and civilian knowledge. There is no reason to suppose that we should find higher wisdom in a Master-General of Ordnance, or a separate Ordnance Department, than we obtain from the Ordnance Select Committee. We should certainly have more expense and possibly more inter-departmental friction. It would seem the wiser course to leave the design of guns as at present, throwing, perhaps, a greater personal responsibility on the President and Vice-President of the Ordnance Select Committee.

We have frequently committed the error of giving large orders without sufficient trial of a pattern gun.

Turning to our resources for manufacture, the alleged delay in the supply of guns for vessels ready for sea was met by Mr. Forwood, in a recent speech in Lancashire, with an unqualified contradiction:—

Mr. Forwood's speech.

"Since 1886 much progress had been made in the provision of reserve of guns and munitions of war. The number of breech-loading guns completed since that year had increased from 618 to 1512. Of these in 1886, only 34 were heavy guns of 8 in. and over, the largest being 12 in., whilst in 1890 we had 1230 such guns, the heaviest being 16¼ in. These guns were all tested once on proof, and a second time on shipboard by the users, and he had never heard of a complaint."

The manufacture of guns by private firms should be encouraged.

It would be for the public advantage to increase the area of supply, not only for the parts of guns, but for the completely manufactured guns. The plant required for the manufacture of heavy guns is costly, and, without a sufficient encouragement from the Government, private manufacturers naturally hesitate to embark in a new and difficult business. The resources now concentrated in Krupp's gun factory at Essen, and in a less degree in two or three establishments in France, could only have been brought into existence by a reliance upon a steady demand from the Governments of the two countries. In England we have had the two supplementary gun factories formed by Armstrong and Whitworth. It is understood that Messrs. Vickers, of Sheffield, and the Palmer Company at Jarrow have now been induced to enter the field. The Government will do wisely not to push competition unduly. Having agreed on prices, which experience gained at Woolwich shows to be reasonable, it would be policy to distribute orders to competent private establishments. In France the happy mean has been reached between the entire dependence on private works, as in Germany, with the inevitable consequence of subjecting the Government to the caprices and conveniences of one concern, and the contrary plan of entire dependence on Government works, as in France before the Franco-German war. In France, under the new system, the Government establishments are retained; but only as gun factories, in which the parts are assembled. For foundry work, dependence is placed on the private industries of the country. Many of these works have found it to their profit to establish gun factories. The French system is strongly commended by the highest military and naval authorities in France—by the author of 'L'Histoire de l'Artillerie Française,' and by M. Gougeard. The American Gun Foundry Board recommends the adoption in the United States of the system now pursued in

France and Germany.

France. A nation which does not draw on private enterprise to supply the material of war will soon be distanced in the race by Powers which have the wisdom to secure the support of such valuable auxiliaries.

There is reason to believe that in our own country the plan adopted by the French authorities is now being followed. The modern breech-loading guns are built of eighteen different forged pieces; each of these can be separately supplied from the private trade. Thus the work to be done in the Government establishment at Woolwich is reduced to the assembling of the several parts, and building them into a finished gun. This method of manufacturing offers the means of utilising to the fullest extent the extensive resources of private trade, while retaining the guarantee for perfection of manufacture which we ought to possess in the Royal Arsenal.

Objections to large guns.

In dealing with the general question of the dimensions of ships, the objections to monster ordnance have already been sufficiently stated. It is needless to insist on a range which the human eye cannot measure, and powers of penetration in excess of the resistance offered by the stoutest armour. We have overcome difficulties of manufacture from the smaller pieces up to the 68-ton gun. We may well rest content with a successful gun of this large calibre.

CHAPTER X.

Shipbuilding.

British Navy Programme.

Naval Defence Act.

Ships to be added to the Navy.

The year 1889 has been an especially eventful and remarkable one for the Navy, not only in England but in other countries also. In March the First Lord of the Admiralty announced a Naval Defence Act, involving an expenditure distributed over a term of years amounting to £21,500,000. The Naval Defence Act authorised the construction and completion between 1889 and 1894 of 10 battle-ships, 9 first-class protected cruisers, improved Mersey-type, 29 second-class protected cruisers improved Medea type, 4 second-class protected cruisers Pandora type, and 18 first class torpedo gunboats of the Sharpshooter class.

The following Return shows the number of ships which it was proposed to add to the Navy between April, 1889, and April, 1894:—

I.—Ships in Progress.

Class of Ships.	Displacement Tonnage.	Indicated Horse Power.	Name.
Battle Ships, 1st Class	10,600	11,500	Camperdown.
	11,940	12,000	Trafalgar.
	11,940	12,000	Nile.
	10,470	14,000	Victoria.
	10,470	14,000	Sans Pareil.
1st Class Protected Cruisers	9,000	20,000	Blake.
	9,000	20,000	Blenheim.
2nd Class Protected Cruisers	2,950	9,000	Melpomene.
	2,950	9,000	Magicienne.
	2,950	9,000	Marathon.

I.—Ships in Progress—*continued.*

Class of Ship.	Displacement Tonnage.	Indicated Horse Power.	Name.
3rd Class Protected Cruisers	1,830	6,000	Barham.
	1,830	6,000	Bellona.
	1,580	3,000	Barrosa.
	1,580	3,000	Blanche.
	1,580	3,000	Blonde.
	1,580	3,000	Barracouta.
Torpedo Depot Ship	6,620	12,000	Vulcan.
Torpedo Gunboats	735	4,500	Sharpshooter.
	735	4,500	Salamander.
	735	4,500	Seagull.
	735	4,500	Spanker.
	735	4,500	Speedwell.
	735	4,500	Sheldrake.
	735	4,500	Skipjack.
Sloops	1,170	2,000	Beagle.
	1,170	2,000	Basilisk.
Gunboats, 1st Class	805	1,200	Magpie.
	805	1,200	Redbreast.
	805	1,200	Redpole.
	805	1,200	Sparrow.
	805	1,200	Thrush.
	805	1,200	Lapwing.
	805	1,200	Ringdove.
	805	1,200	Widgeon.
	805	1,200	Goldfinch.
Sailing Training Brig	508	..	Mayflower.
Ships for Service in Australian Waters.			
2nd Class Protected Cruisers	2,575	7,500	Pandora.
	2,575	7,500	Pelorus.
	2,575	7,500	Persian.
	2,575	7,500	Phœnix.
	2,575	7,500	Psyche.
Torpedo Gunboats	735	4,500	Whiting.
	735	4,500	Wizard.
Total number of Ships in progress.	..	..	43

II.—Ships to be Built under the New Programme.

Class of Ship.	Displacement Tonnage.	Indicated Horse Power.	Number to be Built.
Battle Ships, 1st Class	14,150	13,000	8
Battle Ships, 2nd Class	9,000	10,000	2
Cruisers, 1st Class, Protected	7,350	12,000	9
Cruisers, 2nd Class, Protected, Improved Medea type	3,400	9,000	29
Cruisers, 2nd Class, Protected, Pandora type .	2,575	7,500	4
Torpedo Gunboats, Sharpshooter class . . .	735	4,500	18
Total . . .			70

III.—Abstract of Ships, including those proposed in New Shipbuilding Programme, which will be added to Her Majesty's Navy in the period between 1st of April, 1889, and 1st of April, 1894.

Class of Ships.	Number now in Progress.	Number to be Built under the New Programme.	Total Number.
Battle Ships, 1st Class	5	8	13
Battle Ships, 2nd Class	..	2	2
1st Class Protected Cruisers	2	9	11
2nd Class Protected Cruisers	3	29	37
2nd Class Protected Cruisers for Australia . .	5		
2nd Class Protected Cruisers, Pandora type . .	..	4	4
3rd Class Protected Cruisers	8	..	6
Torpedo Depot Ship	1	..	1
Torpedo Gunboats	7	18	27
Torpedo Gunboats for Australia	2		
Sloops	2	..	2
1st Class Gunboats	9	..	9
Sailing Training Brig	1	..	1
Total . . .	43	70	113

The following table shows the number of ships which will probably be removed from the Navy as obsolete, or not worth repair, between April, 1889, and April, 1894:—

Class of Ships.	Displacement Tonnage.	Indicated Horse Power.	Name.
Battle Ships, 3rd Class	6,270	2,540	Defence.
	6,710	3,350	Valiant.
	9,210	5,270	Warrior.
	6,710	3,260	Hector.
Cruisers, Unprotected, 2nd Class	6,250	7,480	Shah.
Cruisers, Unprotected, 3rd Class	2,120	2,190	Opal.
	2,120	2,000	Tourmaline.
	2,120	1,990	Turquoise.
	2,120	1,830	Ruby.
	2,122	2,170	Emerald.
	2,120	2,000	Garnet.
	1,970	2,140	Diamond.
Sloops, Unprotected	1,130	1,090	Wild Swan.
	1,130	1,110	Penguin.
	1,130	1,010	Osprey.
	1,130	950	Cormorant.
	1,130	1,010	Dragon.
	1,130	970	Pegasus.
	1,130	1,020	Miranda.
	940	920	Daring.
Gun Vessels, 2nd Class	835	760	Ranger.
	835	810	Algerine.
	780	720	Falcon.
	610	890	Ready.
Gunboats, 2nd Class	455	510	Firm.
	455	480	Forester.
	455	460	Firebrand.
	455	470	Firefly.
	438	530	Zephyr.
	430	430	Merlin.
Total number	..	..	30

ABSTRACT OF THE ABOVE TABLE.

Class of Ship.	No.
Battle Ships, 3rd Class	4
Cruisers, 2nd Class, Unprotected	1
Cruisers, 3rd Class, Unprotected	7
Sloops, Unprotected	8
Gun Vessels, 2nd Class	4
Gunboats, 2nd Class	6
Total	30

NOTE.—In addition to this list there will be many other vessels in the course of the next five years which, though not considered to be worth repairing, re-arming, re-boilering, &c., at a large expense, on account of their obsolete character, slowness of speed, &c., will be sufficiently sound in hull and boilers to be utilised in case of emergency for such further special service as may be found convenient to employ them on, and these have accordingly not been shown as probable removals.

Having given the First Lord's proposals for the future, we reprint from the columns of the *Daily News* the following summary of the work done for the Royal Navy in 1889:—

Work done in 1889.

"The year 1889 has been an unusually active and important one, so far as the Royal Navy is concerned. It has witnessed the launch of an extraordinary number of fast cruisers, the laying down of an altogether exceptional number of war-ships of all classes, and the completion and commissioning of what by any other Naval Power would be looked upon as a very large fleet, which includes some of the finest vessels afloat. Last year, at about this time, we gave a synopsis of the work of the dockyards in 1888. The table on page 103 is in continuation of one which was then printed; and it shows the name, displacement, extreme speed, number of guns, and place of building of every war-ship that has been launched for the British Navy in 1889.

Comparison with work done in 1888.

By reference to the table it will be seen that, excluding the 23 torpedo-boats, there have been launched during the twelve months now ending, 31 vessels, with an aggregate displacement of 52,110 tons. The figures in 1888 were 17 vessels, with an aggregate displacement of 34,520 tons. Of 36 vessels that were at the end of last year described as being under construction, all save five—the Blenheim, Bellona, Gossamer, Gleaner, and Mayflower—have since been launched. Three of them, the two first and the last, belong to the old building programme, and are in progress—the Blenheim at Blackwall, the Bellona at Hepburn-on-Tyne, and the Mayflower, a wooden training brig, at Pembroke. The remaining two, the Gossamer and Gleaner, although they were ordered by anticipation on September 5, 1888, are included in the long list of ships authorised to be built under the Naval Defence Act of 1889. This Act, it will be remembered, provides for the construction and completion, between 1889 and 1894, of 10 ironclads, 9 first-class protected cruisers, 29 second-class protected cruisers of an improved Medea type, 4 second-class protected cruisers of the Pandora type, and 18 torpedo gunboats of the Sharpshooter class. Arrangements for the construction of all these ships have not yet been concluded; but the list of vessels with regard to which contracts have been signed, orders given, or work commenced, is a sufficiently formidable one, and is as follows:—

Ships in royal dockyards.

"First-class turret battle-ship: Hood, 14,150 tons, Chatham.

"First-class barbette battle-ships, each of 14,150 tons: Royal Sovereign, Portsmouth; Renown and Repulse, Pembroke.

Ships Launched in 1889.

Name.	Tons.	Speed.	Guns.	When.	Where.
Blake	9,000	22	12	Nov. 23	Chatham.
Vulcan	6,620	20	8	June 13	Portsmouth.
Pandora	2,575	19	8	Aug.	Elswick.
Phœnix	2,575	19	8	Oct. 28	Clydebank.
Pelorus	2,575	19	8	Nov. 25	Elswick.
Psyche	2,575	19	8	Sept. 6	Clydebank.
Persian	2,575	19	8	Dec. 9	Elswick.
Barham	1,830	19·5	6	Sept. 11	Portsmouth.
Blanche	1,580	16·5	6	.. ..	Pembroke.
Blonde	1,580	16·5	6	Oct. 22	Pembroke.
Barrosa	1,580	16·5	6	April 16	Portsmouth.
Barracouta	1,580	16·5	6	May 16	Sheerness.
Basilisk	1,170	14·5	8	April 6	Sheerness.
Beagle	1,170	14·5	8	Feb. 28	Portsmouth.
Widgeon	805	13·5	6	Sept.	Pembroke.
Redpole	805	13·5	6	Aug.	Pembroke.
Goldfinch	805	13·5	6	May 18	Sheerness.
Lapwing	805	13·5	6	March 7	Devonport.
Ringdove	805	13·5	6	April 30	Devonport.
Magpie	805	13·5	6	March 15	Pembroke.
Redbreast	805	13·5	6	April 25	Pembroke.
Sparrow	805	13·5	6	Sept. 26	Greenock.
Thrush	805	13·6	6	Oct. 10	Greenock.
Wizard	735	21	2	Sept.	Elswick.
Whiting	735	21	2	,,	Elswick.
Salamander	735	21	2	May 31	Chatham.
Seagull	735	21	2	,, 31	Chatham.
Sheldrake	735	21	2	March 30	Chatham.
Skipjack	735	21	2	April 30	Chatham.
Spanker	735	21	2	Feb. 27	Devonport.
Speedwell	735	21	2	March 15	Devonport.
Torpedo Boats:—					
Six 1st Class	100	22·5	..	.. ..	Poplar.
Three 1st Class	96	23	..	.. ..	Chiswick.
Three 1st Class	96	23	..	.. ..	Cowes.
One 1st Class	96	23	..	.. ..	Paisley.
Ten 2nd Class	15	16·5	..	.. ..	Poplar.

"Second-class barbette battle-ships: Centurion and Barfleur, each of 9000 tons, Portsmouth.

"First-class protected cruisers, each of 7350 tons; Centaur, Portsmouth; Edgar, Devonport; Hawke, Chatham.

"Second-class cruisers (improved Medeas), each of 3400 tons. Apollo and Andromache, Chatham; Æolus, Astræa, and Bonaventure, Devonport; Brilliant, Sheerness.

"Second-class cruisers (Pandora type), each of 2575 tons; Pallas, Portsmouth; Phœbe and Philomel, Devonport; Pearl, Pembroke.

"Torpedo gunboats, each of 735 tons; Antelope, Devonport: Circe, Hebe, Leda, Gleaner, and Gossamer, Sheerness.

Ships in contractors' yards.

"The ships to be built in private yards include first-class barbette battle-ships each of 14,150 tons: Ramillies and Resolution, Palmer's yard; Revenge, Thomson's yard; Royal Oak, Laird's yard.

"First-class protected cruisers, each of 7350 tons: Endymion, Earle's yard; Gibraltar, Napier's yard; Grafton, Thames Ironworks yard.

"Second-class cruisers (improved Medeas), *a*, sheathed, each of 3600 tons: Indefatigable, Intrepid, Iphigenia (London and Glasgow Company's yard), Pique, Rainbow, Retribution (Palmer's yard), Sirius, Spartan (Armstrong's yard). *b*, unsheathed, each of 3400 tons: Latona, Malampus, Naiad (Naval Construction and Armament Company's yard), Sappho, Scylla (Samuda's yard), Sybille (Stephenson's yard), Terpsichore, Thetis, Tribune (Thomson's yard).

"The names of the vessels concerning which no definite arrangements have yet been made are—cruisers, each of 7350 tons: St. George, Theseus, Crescent. Improved Medeas, of 3400 or 3600 tons: Cambrian, Charybdis, Flora, Forte, Fox, Hermione. Torpedo gunboats, each of 735 tons: Alarm, Dryad, Halcyon, Harrier, Hazard, Hussar, Jason, Jasseur, Niger, Onyx, Renard, Speedy.

Summary.

"Thus we may be said to have actually laid down during the year no fewer than 49 vessels, of which 25, with a displacement of 131,760 tons, are building in the Royal, and 24, with a displacement of 138,050 tons, in the private yards of the country. In the same period the following vessels have been removed from the *Navy List*:—Albatross, Arab, Ariel, Beacon, Buffalo, Condor, Contest, Coquette, Cracker, Cygnet, Enchantress, Encounter, Express, Fantôme, Flirt, Flying Fish, Hart, Hood, Hornet, Jackdaw, Kestril, Lily, Lord Warden, Lynx, Monkey, Moorhen, Mosquito, Osprey, Pert, Pioneer, Rainbow, Repulse, Rocket, Sprightly, Thistle, and Wards. Though formidable in numbers, these vessels had an aggregate displacement of only about 37,000 tons. Simply by the launches of the year, therefore, the Navy makes a net gain of some 15,000 tons displacement.

Ships removed from the *Navy List*.

Hereafter the net gain will be something far more considerable, most of the hopelessly obsolete craft having now been removed from the list, and the Navy in consequence containing a much greater proportion of serviceable vessels than it has contained for very many years." Comparison of ships launched with those removed from the *Navy List.*

It will be interesting to add to the information supplied by the *Daily News*, a summary given in the *Army and Navy Gazette*, of the distribution of the new work among the private yards of the country:—

"During the past three or four months the Admiralty have signed orders for the construction of additions to the Navy involving 16¼ millions sterling, and of this nearly 11 millions have been given out in contracts to private firms. The new ships are all in connection with the programme adopted in the last Session of Parliament. At that time Lord George Hamilton stated that it was the desire of the Naval Lords to divide the work as widely as possible, and this has been carried out very equitably. A contemporary, basing its estimates on data which it has got from some of the tenders for the work, gives an approximation of the value of the contracts located in the different districts. The Clyde comes first with £3,260,000, while the Tyne makes a close second with £3,186,000. The Thames builders and engineers are credited with slightly over £3,000,000, the Mersey with about £1,000,000, Hull and Barrow with about £660,000 each. This gives a total of £11,766,000, which should give a good fillip to industries in the various localities. Birmingham profits to a considerable extent also, and Sheffield for the armour armament and heavy castings." Summary in *Army and Navy Gazette.* Distribution of the work over the private yards.

In connection with the large number of ships building by contract a new appointment has been made for which the Admiralty are entitled to credit: Rear-Admiral George Digby Morant has been appointed to the post of Superintendent of the ships building by contract. Admiral Morant's appointment.

Memorandum by Lord George Hamilton.

We now come to the work proposed to be done during the year 1890–1891, and we cannot do better than reprint the following from the Memorandum of Lord George Hamilton, issued as a Parliamentary Paper to accompany the Navy Estimates for that year. First Lord's Memorandum with Navy Estimates of 1890-91.

Progress of Shipbuilding.

"In order to make clear the advance in shipbuilding during the past year, it is necessary to classify the vessels in course of construc-

tion, according to the separate and distinct financial arrangements which have been made to meet their cost.

Ships paid for out of ordinary Naval votes.

"First in order are the ships built by contract and in the dockyards contained in the old shipbuilding programme sanctioned prior to April, 1889. The whole cost of these vessels is defrayed from the Parliamentary votes.

Naval Defence Act of 1889.

"In the second place must be considered the ships to be built under the Naval Defence Act of last Session. These comprise (*a*) 38 ships to be built in the dockyards; and (*b*) 32 to be built by contract.

Ships paid for out of the Annual votes.

"(*a*) The 38 dockyard ships are to be paid for by moneys annually voted by Parliament, but any balance unexpended at the close of the year out of the funds appropriated to their construction is to be carried to the credit of the account in the forthcoming year.

Ships paid for out of the Consolidated Fund.

"(*b*) The cost of the 32 ships to be built by contract is to be defrayed by a fund of £10,000,000, so placed at the disposal of the Admiralty, as to enable the whole of these vessels to be laid down and completed with the utmost celerity. No part of this sum is borne on the votes presented to Parliament.

Ships paid for under a special arrangement.

"Thirdly, the Australian squadron was built under the Act of Parliament already referred to, and the funds were provided under a special arrangement. No portion of the capital representing the first cost of this expenditure is contained in the annual votes.

Summary.

"It will thus be seen that the cost of the vessels in the categories 2, (*b*), and 3 is excluded from the Estimates now presented to Parliament. But in order that Parliament might be in possession of the progress of and expenditure on the whole of the ships building and completing, a form of account has been specially framed for publication in the Estimates in which full information is given concerning all these vessels.

Dockyard Work.

Old programme.

"The programme for 1889–1890 provided for the completion of 33 new vessels and passing them into the 1st Class Reserve during the year. These ships are as follows:—

"Armoured ships: Trafalgar, Victoria, Sans Pareil, Camperdown.

"Protected ships: Magicienne, Marathon, Melpomena, Bellona, Barham, Barracouta, Barrosa, Blanche, Blonde.

"Unprotected ships: Basilisk, Beagle, Sharpshooter, Gossamer, Salamander, Seagull, Sheldrake, Skipjack, Spanker, Speedwell, Goldfinch, Lapwing, Magpie, Redbreast, Redpole, Ringdove, Widgeon, Sparrow, Thrush, Mayflower.

"This part of the programme will be carried out except as regards ten of the vessels, viz.:—

"The armoured ship Sans Pareil, whose guns will not be delivered till some time in the year 1890–91; the protected ships—Bellona, not delivered in time by contractors; Barham, delayed by machinery not being delivered in time; and Blanche and Blonde, the machinery of which was delayed in delivery by the contractors; and the unprotected ships Salamander, Seagull, Sheldrake, and Skipjack, which will be delayed by steam trials; and the Gossamer, which was kept back in order that a sister ship, building at the same yard, might be advanced beyond the programme rate, this arrangement having been found more convenient for the work of the dockyard. **Ships whose completion is delayed.**

"The vessels thus left incomplete in 1889–90 will be completed early in the financial year 1890–91.

"The whole of the ships that were ordered and commenced before 1889–90 will be completed during 1890–91, with the exception of Blake and Blenheim, thus leaving—with the exception of the two vessels named—only ships of the new programme for the financial year 1891–92.

"Of the 38 vessels of the new programme under the Naval Defence Act that are to be built in the dockyards, 21 have already been commenced, seven more will be commenced in 1890–91, and only ten will be left to commence after March, 1891. The ten thus left till after next year are five second-class cruisers (Apollo class), and five torpedo gunboats. **New programme.**

"The design of the second-class battle-ships has been most thoroughly considered, and is now nearly complete, but as a final decision has not been reached by the Board, any description is not possible at present.

Contract Work.

"Of the 32 vessels that have to be built by contract under the Naval Defence Act, 26 were ordered before the close of 1889. The remaining six vessels are torpedo gunboats which admit of being rapidly constructed, and which have been held over for the present. These 26 vessels include:—

Battle-ships of the 1st class . . .	4
Protected cruisers of the 1st class . .	5
" " " 2nd " . .	17
	26

"It was decided, after careful consideration, to give to the dockyard-built ships of each type a sensible start upon the contract-built

Ships in dockyards to be in advance of those in the private yards.

ships of similar type, in order that all details of fitting and equipment might be thoroughly worked out in the dockyards by naval and professional officers, and thus be available for guidance in the construction of the contract-ships.

Order of placing the contracts.

"Furthermore, it was preferred to place the orders for the several types of vessels successively. First, the 17 second-class cruisers were dealt with, then the five first-class cruisers, and finally the four first-class battle-ships. This course of procedure has proved most satisfactory under very difficult circumstances. Eleven of the leading ship-building firms in the country have been intrusted with the construction of the vessels, nearly all of them having had previous experience of war-ship construction. The work has also been widely distributed. Eight of the vessels are building on the Tyne, eight on the Clyde, four on the Thames, three at Barrow, two at Hull, and one on the Mersey. Work on the second-class cruisers is rapidly advancing; the larger cruisers and the battle-ships are as yet in early stages of construction. Particulars of the progress made, as evidenced by expenditure, will be found in the Navy Estimates.

Distribution of the work.

Vessels remaining to be built by contract.

"The whole of the 32 vessels to be built by contract have thus been placed, except six torpedo gunboats, which have been kept back purposely, pending the conclusion of the steam trials now going on.

"The designs of all these classes are described in the statement of last year. The only point requiring any mention is the addition that has been made to the boiler power of the cruisers in order to increase their steaming capacity under the conditions of actual service. All the torpedo-boats which were in progress at the beginning of the financial year have been delivered by the builders, and it is not proposed to order any new boats in 1890–91.

Vessels for the Australian service.

"The vessels building by contract for Australian service under the Imperial Defence Act of 1888 have been somewhat delayed in progress. They are, however, now far advanced towards completion, and it is anticipated will be ready for service next summer.

Improvements in Details of Design.

Experience gained by the Naval Manœuvres of 1889.

"During the manœuvres of 1889 a large number of new vessels were employed. Three classes attracted special attention, each of which was represented by several examples. There were five vessels of the Admiral class, six of the Orlando class, and five of the Medea class. As might have been anticipated in vessels of new type when first commissioned, improvements in matters of detail were suggested as the result of experience. The most important of these had relation to coal transport and ventilation of engine-rooms beneath

protective decks. These suggestions have been carefully considered, and the improvements considered necessary are now in progress.

"In the ships of the Naval Defence Act these improvements form part of the original design.

Reconstruction and Repairs.

"With regard to the reconstruction and refit of ships in commission and reserve, the Triumph, Audacious, Ruby, and Penguin have been completed; and the work upon Thunderer, Minotaur, Superb, and Achilles has been advanced during the year to such an extent that all, except Achilles, will be finished early in 1890–91. **Ships refitting.**

"These ships could have been completed in 1889–90 if it had not been necessary to carry out unforeseen alterations and additions to ships in the first and second classes of the reserve, which were of pressing importance, and thus took precedence of work upon the ships named.

"The Devastation and Rupert could not well be spared from their stations to be taken in hand for placing their new engines on board until the beginning of April next.

"At the naval yards abroad the work upon ships for recommissioning has been practically carried out during the year, as laid down in the Estimates. **Yards abroad.**

Financial Prospect of Naval Defence Act.

"During the financial year 1889–90 the extraordinary activity displayed in shipbuilding and other industries for the mercantile marine has caused a remarkable rise in the price of the materials employed in ship-building and of labour on contract-built ships. **Recent rise in price of material.**

"Under the Naval Defence Act the estimates of the cost of the work to be done were so framed as to allow a margin for rise in prices and other contingencies. This margin has, in many of the contracts made for hulls and machinery, been more than absorbed in consequence of the inflation of prices during the past year. **Prices inflated.**

"Of the ships building or to be built in the dockyards, their ultimate actual cost as compared with the estimates made last year, must to a considerable extent be determined by the prices prevailing during the next three years. At present the tendency of business operations seems to indicate a fall in existing prices, but a reliable forecast is not at present practicable. **Prices of dockyard ships must depend on prices ruling during time of building.**

"The Admiralty are not, therefore, in a position to say now whether during the next three years, further sums may not be required to satisfactorily carry out the work of completing and thoroughly

equipping the 70 ships included in the programme of the Naval Defence Act. So soon as information is obtained sufficient to justify an authoritative statement on the subject, a full communication will be made to Parliament. In the meantime the contracts made and liabilities incurred will be kept well within the authorised maximum."

Times leader on the First Lord's statement.

We conclude this Chapter by quoting the *Times*' remarks explanatory of the Naval Defence Act of 1889:—

"Lord George Hamilton's statement explanatory of the Navy Estimates for 1890-91, which has been issued as a Parliamentary paper, contains much interesting comment upon a text which in its naked simplicity is found by many people somewhat difficult reading, notwithstanding the genuine public interest to which the increase of our Naval strength is unquestionably due.

Total amount compared with the Estimates for 1889-90.

Naval Defence Act of 1889.

The estimated expenditure upon the Navy for the ensuing financial year is £13,786,600, being an increase of £101,200 over the Estimates for 1889-90. Some difficulty has always been felt by the public in understanding the exact scope and effect of the Naval Defence Act of last year, which dealt with a sum of £21,500,000 On one side it has been supposed that this sum constitutes an addition to the money spent year by year in the ordinary way; and on the other side it is sometimes asserted that the Act is illusory, and that we are simply maintaining the Navy at the old rate. The confusion arises from the fact that while the Act gives Parliamentary sanction once for all to the expenditure of £21,500,000 upon specified undertakings, £11,500,000 are voted year by year as part of the annual provision for the Navy, while £10,000,000 are charged upon the Consolidated Fund, thus constituting a source of naval revenue independent of the annual votes.

Scope of the Act of 1889.

Thus the Act fixes a minimun of £2,650,000 to be expended in each year for five financial years upon dockyard ship-building, and £600,000 to be yearly expended during the same period upon armament. If these sums are not fully spent in any one year, the balance unexpended remains at the disposal of the Admiralty in such fashion that the available total for the whole term shall suffer no reduction. Thirty-eight vessels are to be built with this money, and of these twenty-one are already begun, seven will be begun in the coming year, and ten of the lighter types will be left to begin after March, 1891. Thirty-two vessels are to be built by contract out of the £10,000,000 set apart and charged upon the Consolidated Fund. Of these, twenty-six have been ordered during the year now closing. The remaining six are torpedo gunboats, capable

of rapid construction, and held over for the present in order to obtain the benefit of the latest experience. Thus the effect of the Naval Defence Act is to fix an irreducible dockyard programme for five years, the cost of which appears in the Estimates, and in addition to provide during the same five years ten millions' worth of ships built by contract, and not appearing in the annual accounts. Ships begun earlier than last year have to be completed out of the sums charged in the Estimates. It is expected that the whole of them will be completed in the course of the incoming year, with the exception of the Blake and the Blenheim. Ten which ought to have been finished by this time have been delayed for various reasons of a more or less satisfactory kind. The vessels building by contract for Australian service under the Imperial Defence Act of 1888 have also been delayed, but it is hoped that they will be ready in the course of the summer. No portion of the cost of these vessels appears in the annual votes, and against it there is the set-off of considerable contributions payable by the colonies for twelve years.

Effect of the Naval Defence Act of 1889.

Australian service vessels.

"Many vessels of new designs were employed in the naval manœuvres of last year, and the experience then gained has been useful in various ways. Details of boilers and machinery, of coal transport and ventilation of engine-rooms, have undergone improvements which are embodied in the original designs of the ships built under the Naval Defence Act. In particular, it is satisfactory to know that the boilers of the new cruisers have been increased in power from 16 to 25 per cent., and that special attention has been given to the development of high speed under ordinary service conditions. In other words, the measured mile performances, which are wholly exceptional, are not any longer to be treated as indications of the work to be got out of the machinery under ordinary conditions.

Improvements in ships and their machinery.

"There appears to be a notable improvement in the supply of heavy guns, and the Admiralty also take credit for having greatly increased the stock of ammunition. But the condition of the Navy in both respects was so dangerously bad that even with considerable improvement it may be doubted whether we are yet in a satisfactory position. While it is held fitting and proper that the Navy should have a few 110-ton guns, it is intimated that their extended use is no longer thought desirable. These monsters are treated with a sort of gingerly consideration, which leaves the impression that they are privately regarded as a highly respectable blunder. Many things are left unsaid which might very well be said about them, but as the Admiralty seem desirous to revert quietly to more manageable and less costly weapons, it is no longer necessary to

Improvement in supply of guns.

criticise them severely. We are reminded by the Admiralty that they are merely purchasers and users of guns and are not responsible for their design or manufacture. The Navy, however, does provide its own mountings, and it is intimated that this part of the business is done with great efficiency. That is more than could be claimed for it were the gun-carriages supplied by Woolwich.

Increase in *personnel.*

"A fleet is not of much use without sailors to man it, and the August manœuvres were particularly valuable as showing what defects had to be made good in the *personnel.* We gather from the paragraphs devoted to this part of the subject that considerable room for improvement was found to exist. There is an addition of 3400 men, chiefly stokers and engine-room artificers, which follows an addition of 3000 last year. Much of this increase is of course due to the actual increase in the number of ships, but part may, we hope, be referred to a more enlightened appreciation of the need for skilled and trained men to develop the full powers of our costly machinery. We are told that the experience gained at the manœuvres shows it to be impossible to work a modern war-ship with a crew which has only had a general training on some totally dissimilar and possibly obsolete vessel. Seeing that almost every vessel is an experiment and possesses features peculiar to itself, one might have thought this discovery attainable without manœuvres. We may, however, be thankful that the lesson has at length been learnt.

Change in composition of the Channel squadron.

"One practical and striking result is a complete change in the character of the Channel Squadron. Hitherto it has been composed of the older ironclads, broadside vessels capable of carrying large complements of men. It was assumed that these men would be capable at a moment's notice of taking over the more modern ships of the reserve. Now that this curious delusion has been exploded the Channel Squadron is to consist of modern ships of high speed and great coal endurance. Four sea-going ironclads are also to take the place of the wooden hulks that now serve as flagships in the home ports. When this change is carried out there will be a large force in home waters available for active service at short notice and quite independent of the remodelled Channel Squadron. There will be the four ironclad flagships in full commission and ready for sea at a few hours' notice. There will be the nine ironclads in commission and associated with the coastguard system which are to be fit for service at forty-eight hours' notice. Finally, there will be the first-class steam reserve in the home ports, which is to comprise six ironclads, two belted cruisers, and sixteen cruisers, besides gunboats and torpedo-boats. All these are supposed to be capable of going to sea at five

Ironclads as flagships at home ports.

First-class steam reserve ships.

days' notice. Some of the ironclads will be of the older types and unfit to go far from home, but they will nevertheless be formidable vessels for coast-defence. Though the Channel Squadron retains its name and its present headquarters, it will be relieved of the more urgent duties of home-defence, and after undergoing the conversion we have described will command in case of need a very wide area. At the same time, the Mediterranean squadron has been raised to a force of ten battle-ships and two belted cruisers, at which strength it is to be permanently kept. These changes seem excellent on paper, and we can only hope that they will be thoroughly carried out and effectively maintained.'

Mediterranean squadron.

CHAPTER XI.

SHIPBUILDING.—FOREIGN PROGRAMMES.

FRANCE.

French programme in Estimates for 1890. THE programme of construction, embodied in the Estimates for 1890 for the French Navy, includes six armoured cruisers: two being of the Dupuy de Lôme type, 6300 tons. The four other vessels of this class are similarly protected but with thinner armour, and the displacement reduced to 4745 tons.

Neptune. The list of battle-ships in construction includes: the Neptune at Brest, estimated cost, £780,000; ordered to be laid down 7th October, 1880. $\frac{66}{100}$ths of this vessel will be completed on the 1st January, 1890, and it is proposed to add $\frac{18}{100}$ths during the ensuing year.

Brennus. Brennus, building at Lorient, estimated cost, £804,000; ordered to be laid down 31st December, 1887; commenced January, 1888; will be advanced to $\frac{16}{100}$ths on the 1st January, 1890. It is proposed to add $\frac{21}{100}$ths in the ensuing year.

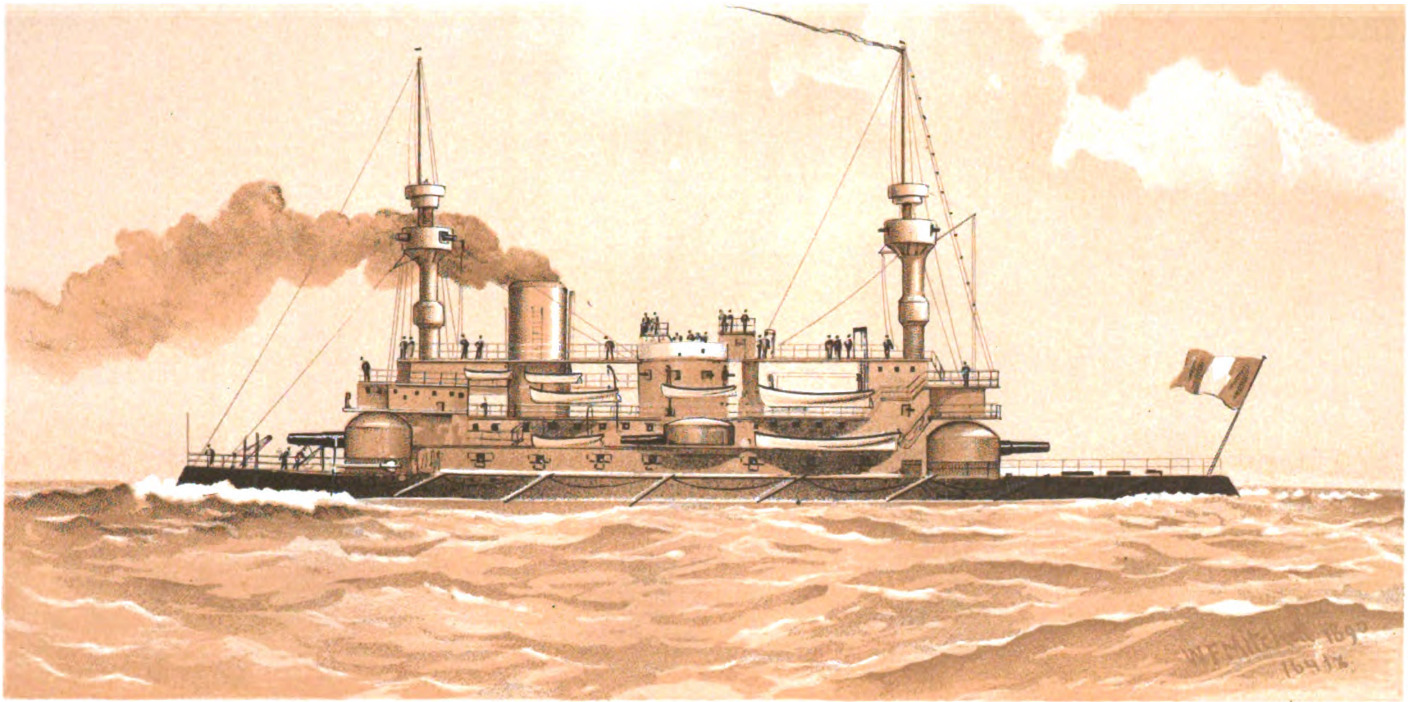
Magenta. Magenta, building at Toulon, estimated cost, £760,960; ordered to be laid down September, 1880; commenced January, 1883; will be advanced to $\frac{59}{100}$ths on the 1st January, 1890. To be advanced $\frac{24}{100}$ths in the ensuing year.

Marceau. Marceau, to be completed. Contract for this vessel taken 27th December, 1880, price, £769,080. The designs for the Neptune, the Brennus, the Magenta, and the Marceau, are by M. Huin.

Tréhouart. The armoured coast-defence vessel, the Tréhouart, is to be built at Lorient from the designs of M. de Bussy.

Phlégéton. *Armoured Gunboats.*—Phlégéton, building at Cherbourg, estimated cost, £142,560; ordered 5th August, 1882; commenced March, 1885; advanced to $\frac{35}{100}$ths 1st January, 1890. To be advanced $\frac{38}{100}$ths in 1890.

Styx. Styx, building at Cherbourg, estimate as for Phlégéton; ordered 5th August, 1882; commenced 23rd March, 1889; will be advanced to $\frac{11}{100}$ths 1st January, 1890; will be advanced $\frac{24}{100}$ths in 1890. The designs for these gunboats are by M. Chandoye.



GRIFFIN & Co. PORTSMOUTH.

"HOCHE."
FRENCH IRON CLAD SHIP.

Dupuy de Lôme.

Armoured Cruisers.—Dupuy de Lôme, building at Brest, estimated cost, £416,304; ordered 26th October, 1887; commenced July, 1888; will be advanced to $\frac{31}{100}$ths 1st January, 1890; will be advanced $\frac{28}{100}$ths in the ensuing year. Design by M. de Bussy.

Four armoured cruisers.

Four additional armoured cruisers are to be built—two in the dockyards at Rochefort and Toulon, and two will be put out to contract.

Latouche-Treville. Chanzy. Charner. Bruix.

Second-class Armoured Cruisers.—Second-class armoured cruisers have recently been put out to contract; the Latouche-Treville at Havre with the Forges et Chantiers de la Méditerranée, and the Chanzy by the Gironde Company at Bordeaux. These two vessels are similar to the Charner, in progress at Rochefort, and the Bruix, which will be laid down in the same dockyard in 1891. The distinctive feature of this cruiser is her protection against shell-fire and the distribution of her guns in armoured turrets. The plans are by M. Thibaudier. The vessels will be built of steel, propelled by twin-screws, the engines being of 7400 horse-power with natural draught, or 8300 horse with forced draught. The principal dimensions are as follows:—Length, 348 feet; breadth (extreme), 46 feet; depth, 18 feet 9 inches; mean draught of water, 19 feet 2 inches; displacement, 4745 tons. The protection consists of an armoured belt extending from end to end with an extreme thickness of just over 3½ inches, an armoured deck 2 inches in thickness below the water-line and 1¾ inches above. A coffer-dam at the side filled with cellulose is built at the water-line from end to end. The ship will be divided into water-tight compartments by numerous transverse and longitudinal bulkheads. There will be an armoured conning-tower forward of the foremast covered with 3¾-inch plates. The armament will consist of two 8-ton guns, six 14-cm., or 3-ton guns, and fourteen machine and quick-firing guns. The estimated cost is taken at £360,000, with a slight addition to the cost for the vessels built in the contractors' yards.

Alger.

First-class Cruisers.—Alger, building at Cherbourg, estimated cost, £280,000; ordered 1st March, 1887; commenced November, 1887; will be advanced to $\frac{63}{100}$ths 1st January, 1890; will be advanced $\frac{31}{100}$ths in 1890. Designs by M. Marchal.

Isly.

Isly, building at Brest, estimated cost, £283,240; ordered 1st March, 1887; laid down August of that year; will be advanced to $\frac{34}{100}$ths 1st January, 1890; will be advanced $\frac{22}{100}$ths in 1890.

Jean Bart.

Jean Bart, building at Rochefort, estimate as for Isly; ordered 18th September, 1886; commenced September, 1887; will be advanced to $\frac{70}{100}$ths 1st January, 1890; will be advanced $\frac{30}{100}$ths in 1890. Designs for the Isly and the Jean Bart by M. Thibaudier.

Suchet. *Second-class Cruisers.*—Suchet, building at Toulon, total estimate, £202,760; ordered 1st March, 1887; commenced October, 1887; will be advanced to $\frac{21}{100}$ths 1st January, 1890; will be advanced $\frac{37}{100}$ths in 1890. Design by M. de Bussy.

Surcouf. *Cruisers of the Third Class.*—Surcouf, building at Cherbourg, estimated cost, £131,200; ordered 7th April, 1886; hull completed. Plans by M. de Bussy.

Lalande. Cosmao. Coetlogon. Lalande and Cosmao, building in the private yard of the Gironde; cost, £133,800. The contract for the former was let on the 21st March, 1887, and for the latter on the 25th April, 1888. Coetlogon, sister ship to the above, building by the Transatlantic Company; contract let 23rd May, 1887. Designer of this vessel M. de Bussy.

A change has been made in the armament of these vessels. Instead of two, as originally intended, they will carry four 14-cm. guns. The principal dimensions are given in the Tables. Protection is obtained by a thin armoured deck, and by coffer-dams at the water line, and by a belt filled with cellulose. The means of securing buoyancy are similar to those adopted in English vessels of the same type. The design for these vessels, remarkable for their extreme length in proportion to their breadth, has been criticised by M. Weyl as wanting in the elegance usually observable in French naval architecture. At the ends the vessels are covered in by a long poop and forecastle respectively.

Wattignies. *Torpedo Cruisers.*—Wattignies, building at Rochefort, estimated cost, £116,760; ordered 26th July, 1888; will be advanced to $\frac{32}{100}$ths 1st January, 1890; to be advanced $\frac{40}{100}$ths in 1890. Designer, M. de Bussy.

Leger. Levrier. *Torpedo-Sloops.*—The Leger and the Levrier should be completed on the 31st December, 1890. Designs by M. Marchal.

First-class torpedo-boats. *Torpedo-Boats of the First Class.*—The numbers 130 to 144 are in progress, and will be completed by 1st January, 1891.

Supplementary Estimates, 1890. Public opinion in France was not satisfied with the programme embodied in the Ordinary Estimates, and on the 15th of July, 1889, Admiral Krantz introduced a Supplementary Estimate. His programme, as explained in his speech, was as follows: That the Minister of Marine should be authorised to expend a sum of £2,320,000 in ships to be built by contract, in addition to the vessels provided for in the Ordinary Estimates. The list included three iron-clads or armoured coast-defence vessels, of 6700 tons, of the Amiral Tréhouart type; four torpedo gunboats of the Leger type of 450 tons, and ten seagoing torpedo-boats. The French Admiralty are carrying out the programme with vigour.

Broad Arrow remarks.

The *Broad Arrow* states that Monsieur Barbey, the Minister of Marine, has signed contracts for two armoured cruisers provided for in the Ordinary Estimates, as well as for three ironclads included in the Supplementary Estimates. The cruisers will cost £344,000 each. The cost of the armoured coast-defence vessels will be £488,960 each.

Charner class. First-class torpedo boats.

In addition to vessels building by contract, two armoured cruisers, also of 4745 tons, one named the Bruix and the other the Charner, have been laid down in the dockyards. Five torpedo boats of the Agile type, 103 tons, five of the Avant Garde type of 119 tons, and twenty of the smaller type of 79 tons, have been put out to contract. These thirty torpedo boats were provided for in the Supplementary Estimates. Two torpedo-boats of the Coureur type, 120 tons, have been ordered from the Forges et Chantiers de la Méditerranée.

Programme of 1891.

The programme of construction for the year 1891 for the French Navy has been settled by the Administration, and before being finally adopted it must necessarily pass under the review of the Commission on the Naval Budget annually appointed by the Chamber of Deputies. In 1891 the expenditure on new construction in the Government dockyards and in the private yards will fall little short of £2,400,000.

Neptune.

Ironclads.—Ten ironclads will be in hand in 1891, including the Neptune, upon which on the 1st of January next $\frac{16}{100}$ths will remain to be built. The vessel will undergo her trials at the beginning of 1891. The Brennus, will be advanced to $\frac{36}{100}$ths in the present year, $\frac{25}{100}$ths will be built in 1891; at the end of next year she will therefore be advanced to $\frac{61}{100}$ths. It may be expected that the ship will be ready for service at the beginning of 1893.

Brennus.

Tréhouart.

Preparations are being made at Lorient to lay down the Tréhouart, a modified Furieux; $\frac{10}{100}$ths are to be built this year, and $\frac{23}{100}$ths in 1891.

Magenta.

The Magenta has been on the building slips of Toulon since January, 1883; $\frac{20}{100}$ths will remain to be built in 1891. It should be noted that the Brennus is of 10,826 tons, the Neptune and Magenta 10,581, and the Tréhouart 6700.

Bouvines. Jemappes. Valmy.

The Navy Adminstration will lay down three more ironclads, the designs of which are not quite settled, and which will be advanced, the one to $\frac{6}{100}$ths and the other to $\frac{8}{100}$ths, while the estimated expenditure for the third is taken at £641,000. In private yards the Bouvines, the Jemappes, and the Valmy, of the same size, will be advanced to $\frac{38}{100}$ths.

Summary.

To sum up: it will be seen that the shipbuilding for the fleet in

1891, according to this programme, will comprise the completion of two armoured battle-ships. Two other vessels already laid down will be in progress, and six new vessels will be commenced, three being ironclads exceeding 10,000 tons, and three of 6590 tons.

Dupuy de Lôme.

Armoured Cruisers.—The Dupuy de Lôme, of 6300 tons, will be advanced to $\frac{61}{100}$ths in the course of the current year, and to $\frac{89}{100}$ths in 1891. The ship will be finished early in 1892.

Charner. Bruix. Latouche-Treville. Chanzy.

The Charner, building at Rochefort, of 4745 tons, will be advanced this year to $\frac{8}{100}$ths, and to $\frac{41}{100}$ths in 1891. The sister ships of the Charner are the Bruix, at Rochefort, which will be advanced to $\frac{14}{100}$ths in 1891; the Latouche-Treville, at Havre; and the Chanzy, at Bordeaux, of which $\frac{10}{100}$ths will be completed in 1890, and 30 more 100ths in 1891. To sum up: five armoured cruisers are in hand. None of these vessels will be ready in 1891.

Phlégéton, Styx.

Armoured Gunboats of the First Class.—Of these there remain two, the Phlégéton and the Styx, at Cherbourg, 1640 tons. The Phlégéton will be finished next year; the Styx will be advanced to $\frac{68}{100}$ths in 1891.

Alger. Isly.

First-class Cruisers.—The Alger, at Cherbourg, 4160 tons, will be ready at the beginning of 1891. On the 1st of January next she will have been advanced to $\frac{95}{100}$ths. The sister ship, the Isly, will be advanced to $\frac{45}{100}$ths, and will be pushed to $\frac{70}{100}$ths in 1891.

Suchet. Davout type.

Cruisers of the Second Class.—The Suchet, 3027 tons, the work of which was suspended at Toulon in order to advance the Davout, has been in hand since October, 1887. It will be advanced in the current year to $\frac{33}{100}$ths, and to $\frac{62}{100}$ths in 1891. It is proposed to lay down three cruisers of the Davout type modified, at Cherbourg, Brest, and Toulon, respectively.

Wattignies.

Torpedo Cruisers.—The Wattignies, 1310 tons, will be finished next year: there will remain to be done $\frac{36}{100}$ths on the 1st of January, 1891. The vessel was laid in October, 1889.

Fleurus.

The Fleurus, similar to the above, will be laid down at Cherbourg at the end of the present year, advanced to $\frac{3}{100}$ths in 1890, and to $\frac{39}{100}$ths in 1891.

Levrier. Leger. Catinat. Iberville. Lavoisseer.

Torpedo-Sloops.—The Levrier and the Leger, at Lorient, 450 tons, will be advanced to $\frac{80}{100}$ths on the 31st of next October. They will be completed in 1891. The Admiralty is in treaty with the private yards for the construction of three ships of the same type, viz. the Catinat, the Iberville, and the Lavoisier, which will each cost, without armament, £52,000. They will be completed next year.

Manche.

Before passing to the torpedo-boats, mention should be made of the two transport-sloops, the Manche, at Cherbourg, and the

Vaucluse, at Rochefort. The Manche will be finished, while no work is proposed to be done on the Vaucluse. It is preferred to put the whole force of workmen in the dockyard at Rochefort on effective ships of war. The same course will be taken at Brest, in the case of the large transport Pacifique, and the sailing-frigate Andromede. It is to be regretted that the construction of these three vessels has been undertaken. Vaucluse

Sea-going Torpedo-boats.—All the vessels of this type will be built in contractors' yards. The Budget provides for two vessels of the Coureur type, to be built by the Forges et Chantiers in 1891; ten other sea-going torpedo-boats, for which no contract has yet been taken, are proposed. The expenditure for these ten vessels will be £105,000, or, approximately, half their total cost. Torpedo-boats.

First-class Torpedo-boats.—The private yards will deliver in the course of the year the torpedo-boats Nos. 130 to 144. They will lay down twenty-two vessels. An expenditure of £30,000, or about half of the total estimate, will be incurred for the alteration of the 35-m. torpedo-boats. Their number is fifty: hence the expense may be estimated at 30,000 francs each.

In conclusion, the expenditure which the Minister desires to have authorised in 1891 for the construction of ships is as follows:—Ordinary Estimates: for the purchase of ships from contractors, and for materials and engines, £1,149,760; for labour in the yards, building, alterations, and fitting out for commission, £407,828. Extraordinary Estimates: purchase of ships from the contractors, £839,020. Sums proposed by the Minister to be voted.

ITALY.

The shipbuilding programme submitted to the Italian Parliament for the year 1890 is as follows:—

First-class Ironclads.

	Tons.	Port.
To fit out Re Umberto . . .	13,298	Naples.
To advance and fit Sicilia . . .	13,298	Venice.

Second-class Armoured Decks.

To advance Etruria	2,200	Contract.
To advance Umbria . . .	2,200	"
To advance Liguria	2,200	"
To advance Marco Polo . . .	3,240	Castellamaro.

Third-class.

	Tons.	Port.
To fit out A	840	Castellamare.
„ B	840	„

First-class Ships.

To lay down C (one ship) . . . . Port. Castellamare.

Second-class Ships.

To lay down D, E, and F (three ships).

Third-class Ships.

To lay down I, J, K, and L (four ships).

Second-class Transports.

To lay down G and H (two ships).

To lay down a Torpedo Sloop.[1]

To lay down after 1st July, 1890 :—
Two First-class Ships.
Four Third-class Ships.
A seagoing Torpedo Vessel.

The amount taken for shipbuilding is £1,336,000.

Re Umberto and Sicilia.

The Re Umberto and the Sicilia are described in the last volume of the American General Information series, thus :—

"The primary battery consists of four 13·5-in., 68-ton B.L. mounted in pairs in two end-barbettes at the middle line. Between these barbettes on the superstructure are eight 6-inch guns of the Armstrong R.F. type; four of them are sponsoned, the two forward for bow, the after for stern fire. Immediately below these, inside the superstructure, are sixteen Armstrong 4·72-in. R.F.G., eight in each broadside. Eight 57-millimètre Hotchkiss R.F.G. and ten machine guns are also carried, and eight above-water torpedo-tubes will be fitted.

Power and speed.

"The estimated speed is 18 knots, the contract I.HP. is 15,200 with natural and 19,500 under forced draft. The contractors are Messrs. Maudslay Sons and Field. The engines, four in number two to each screw, are of the vertical compound type; steam will be furnished by eighteen boilers.

Armour.

"The protection consists of steel armour 13·7-in. thick for the barbettes and ammunition tubes, and 3·3-in. in the complete protective deck; the more recent features are to fit 4 to 6-in. steel

side armour in wake of battery to resist detonating shell and projectiles from R.F.G., and a triple bottom for three-fourths the length for defence against torpedoes. The spaces between the bottoms and between the curved protective deck and deck above are to be filled with coal.

"The vessel is built of steel; has a ram-bow; one large military mast placed in the centre. The complement is to be 21 officers and 654 men. The approximate cost of the ship when completed is estimated at one million sterling."

Etruria. Umbria. Liguria.

The Etruria, the Umbria, and the Liguria are protected cruisers; the forecastle and poop have been extended to form a complete upper deck, making them more seaworthy and giving increased covered space. The batteries are composed of six 6-in. B.L., and four 4·72-in. B.L., I.HP. 6500, estimated speed 20 knots, length 262 feet 6 in., beam 39 feet 6 in., load draught 16 feet 7 in., displacement 2280 tons.

Marco Polo.

The Marco Polo is similar in type to the Vesuvio and the Stromboli. Her displacement is 3500 tons. She carries two 10-in. 28-ton guns, four 4-ton 6-in. breech-loading guns, five 6-pounders, and three 3-pounder machine guns. Her estimated indicated horse-power is 7700, and estimated speed 17 knots.

Tripoli class.

The torpedo vessels A and B are of an improved Tripoli type. The length in each case is 230 feet. The breadth, however, is increased from 25 feet 10 in. to 26 feet 10 in., draught of water from 9 feet 6 in. to 10 feet 3 in., the tonnage from 740 tons to 846 tons, the I.HP. from 2400 to 3240, and the speed from 18 to 22 knots. In the earlier type the armament consisted exclusively of quick-firing guns; in the later the armament will include one 4·72-in. Armstrong R.F.G. with eight quick firers.

The first-class ship C to be laid down will be of a type similar to the Sicilia.

The smaller vessels D, E and F will be repetitions of the Vesuvio or the Piemonte.

Germany.

Estimates for 1890–91.

Turning to Germany, the ordinary estimate for the Navy for 1890–91 has been fixed at £1,914,377, and the extraordinary at £2,524,669, making a total of £4,439,046.

Summary in *Army and Navy Gazette*.

A general summary of the shipbuilding proposed for 1890 was published in the *Army and Navy Gazette* in October last. Four large ironclads, each of 10,000 tons displacement, are to be built at Kiel, Stettin and Wilhelmshaven; they will be armed with 28-ton guns,

mounted on three sponsoned barbettes, one on each side forward, with a third high barbette aft. They will have a belt along the whole length of the water-line. They will steam from 17½ to 18 knots. Unlike the Preussen and other earlier ships, whose plates were manufactured in England, the new ships will be built entirely of German materials. The length of the ships will be about that of the König Wilhelm, 355 feet. It is estimated that each will cost

Cost of each.

£475,000, of which £40,000 will be expended in the first year. The König Wilhelm cost £505,000. Of these four heavy ironclads two will be built by the Vulcan Company at Stettin, the third at the Germania Works, Kiel, and the four at the Imperial Dockyard at Wilhelmshaven.

Small ironclads.

Two smaller armoured vessels, P and Q, will also be built of the Siegfried class by the Weser Company, at a total cost of £175,000, of which £50,000 will have been spent in the year 1889–90. The principal dimensions of the Siegfried are—length 240 feet, breadth 49 feet 3 in., draught of water 17 feet 9 in., displacement 3495 tons, thickness of armour on citadel 9½ in., I.HP. 4800, twin screws, estimated speed 18 knots. The ship is designed for coast defence; she is fitted with a ram. The belt extends the whole length of the water-line, height above water-line 2½ feet, depth below water-line 5 feet; the armour-plating is compound. The hull and all the bulkheads are of steel. The armament will consist of three 24-cm. guns; two of the heavy guns are mounted on sponsoned barbettes forward, the third heavy gun is mounted on a central

Armament.

barbette aft. The armament will include numerous quick-firing guns. Three torpedo tubes will be fitted, one in the bow and two on the broadside; the rudder-head is well protected by the projecting upper works. The ship will have been three years in construction, and will cost £175,000. Ten ships of this type are proposed to be completed in 1895. Two are to be launched in the present year.

Russia.

Russian programme.

The shipbuilding programme now in course of execution for the Russian Navy is given in the *Standard* as under :—

Ironclads.

"For the Russian Navy there are now being built the following ironclads:—Twelve Apostles (Dvenadsat Apostoloff), 8076 tons, at Nicolaieff; George the Victorious (Gheorghy Pobyedonosets), 10,280 tons, at Sebastopol; Gangoot, 6592 tons and Grozyashtchy, 1492 tons, at the new Admiralty works, St. Petersburg; where also, at the Baltic works, the belted cruiser Rurik, 10,000 tons, has been

laid down; while at the Franco-Russian works progress is being made with the Navarin, 9476 tons.

"At Elbing, the Kazarsky torpedo cruiser is being built, besides two first-class torpedo boats at each of the following places:—Elbing, Abo, and Odessa. All these vessels are intended to be ready by 1893." Torpedo cruiser and torpedo boats.

Taking the several ships in detail, the ironclad Emperor Nicholas the First was launched on the 20th of May, 1889, and is now fitting out. The contract for this ship was taken by the Franco-Russian shipbuilding yard at Cronstadt. The vessel is protected by a belt extending along the whole length of the water-line, having a depth of 8 ft. 2 in., extending 5 ft. below, and 3 ft. 2 in. above the water-line, the compound armour having a thickness at the upper strake of 14 in., diminishing to 8 in. at the lower strake. The conning tower is protected by steel armour 8 in. in thickness. The barbette is protected by 10-in. armour. From the barbette rises a revolving turret plated with 10-in. armour and containing the 12-inch guns. This turret is a modification of the original design, and it has not been applied to the sister ship Alexander II. The battery comprises two 12-in. breech-loading 52-ton guns, four 9-in. B.L., eight 6-in., and two 4·2-in. B.L. The auxiliary battery is composed of eighteen quick-firers. Seven torpedo-tubes are fitted. The engines are of 8000 indicated horse-power. Emperor Nicholas. Armour. Armament. Engines.

Turning to the list of ships building, as quoted from the *Standard*, the ironclad called the Twelve Apostles (Dvenadsat Apostoloff) has been commenced at Nicolaieff, and is being pushed on with energy. The dimensions are given in the Russian List, Part II. The displacement will be 8076 tons. The ship will be protected by a partial belt of compound armour of 14 in., diminishing to 12 in. forward and aft. At the forward and aft ends of the belt the ship will be protected by transverse bulkheads of 9-in. and 10-in. armour. She will be propelled with engines of 8500 I.HP. The battery will consist of eight 9-in., 19-ton breech-loading guns. The speed will be 15 knots. Twelve Apostles.

The George the Victorious (Gheorghy Pobyedonosets), now building at Sebastopol, has a battery of six 12-in. B.L. guns, three turrets with several 6-in. B.L., several rapid-fire guns and torpedo-tubes. The heavy guns will be mounted like those of the Sinope, in three pear-shaped barbettes, protected with 14 and 12-in. armour, and having a steel cover $3\frac{1}{2}$ to 2 in. thick, like that now fitted to the Sinope. The engines are to be supplied by Messrs. Maudslay, who have contracted to give 11,600 I.HP., with natural draught, and 15,000 I.HP. with forced draught. The engines will be triple expansion, with George the Victorious.

cylinders of 45-in., 66-in., and 100-in. diameter, and 4-ft. stroke—total weight of engines with shafting, boilers, and water, 1425 tons—price £131,000. The ship, which will have a speed of 16 knots, is to be launched on the 1st of November, 1891, and to be ready for service on the 1st of May, 1893.

Gangoot. The ironclad Gangoot is a ship of 6592 tons displacement—she will be propelled by engines of 5859 I.HP.—driving twin-screws. The armament will consist of six 9-inch 9-ton, and six 6-inch 6-ton breech-loading guns. The ship belongs to the same type as the Alexander II.

Rurik. The Rurik is a vessel of 10,600 tons, and is building at the Baltic works. The ship may be described as a large armoured cruiser of the Alexander II. type, and is intended to have great steaming capacity. With a view of increasing the speed, it is possible that the belt will be of 8-in. armour instead of 10-in., as originally designed. Her dimensions and other particulars are given in the Alphabetical List in Part II.

Navarin. The Navarin, which is being built at the Franco-Russian Company's works, St. Petersburg, may be described as an improvement of the Pamyat Azova—see plate in Part II. The length is 338 ft., beam 67 ft., draught of water 25 ft., displacement 9476 tons, engines 9000 I.HP. The armament will consist of four 12-inch 50-ton guns, eight 6-inch 6-ton B.L. guns, numerous quick-firers, and six torpedo-tubes. The intended speed is 16 knots. It is reported that the trials of the engines of the Pamyat Azova were not entirely satisfactory.

Grozyashtchy The armoured gunboat Grozyashtchy has a displacement of 1492 tons, length 229 ft., breadth 42 ft., draught of water, 10 ft. 10 in. She is built of steel, with double bottom and numerous watertight compartments. The armour on the sides is of a thickness of 5 in., and the armoured deck is plated with twenty-five 1-in. to 1¼-in. plates. A considerable amount of cellulose has been introduced. The armament will consist of one 23-cm. gun on the bow, and one 6-in. gun mounted on the stern, eight quick-firing Hotchkiss guns, and two torpedo-tubes. The engines will be each 1000 HP. The estimated speed is 15 knots. The complement will consist of nine officers and 111 men.

Kazarsky. The Kazarsky, a torpedo-gunboat building at the Schichau works, Elbing, is to have a speed of 21 knots, and is to cost £31,500. Her dimensions are given in the Alphabetical List in Part II.

Torpedo-boats. The torpedo-boat construction in progress includes two first-class boats building for the Baltic fleet at Crichton's Works at Abo, in Finland:—Length 152·3 ft., beam 16 ft. 3 in., speed 22 knots. The

cost of the two will be £34,580. These boats, which have been named the Hogland and the Nargen, will be ready this year. Two first-class boats are building for the Black Sea at Schichau's works at Elbing. One of them, named the Adler, is 152·6 ft. long, 16·9 ft. beam, speed 26½ knots. Cost, £15,200. The other boat, named the Anakria, is a single screw. Both these boats are to be ready this year. Two first-class torpedo-boats have been ordered at Odessa: indicated horse-power 1100; length 126 ft., beam 14 ft. 8 in., draught of water 3 ft. 8 in., displacement 81 tons, speed 21 knots; to be ready in June, 1892.

United States.

The following general summary of the new fleet proposed for the United States is from the *Engineer*:—

"At the present time the United States Government possesses one single coast service armoured-ship of 6060 tons, the Puritan, built in 1885, and four for coast service of 3815 tons each, namely, the Amphitrite, Miantonomoh, Monadnock, and Terror, all built in 1885. There are two vessels building, namely, an armoured cruiser, and a turret-ship, of over 6000 tons each. Beyond this there is nothing armoured but the very old vessels of small size. The Intrepid, a ram of 1123 tons, was launched in 1874, and the Alarm, 720 tons, in 1873. The rest are of 1865 or earlier dates, and are for coast service, taking no rank worthy of notice. **Coast service ironclads.**

"Instead of a completely insignificant fleet, America proposes to have one of 369,000 tons armoured, and in all of 473,000 tons displacement, costing over 55 millions sterling. When it is borne in mind that the programme laid before our House of Commons last year was to provide for 318,000 tons only, and at a cost of 21½ millions sterling, the magnitude of the American programme may be appreciated. It may be noticed that the armoured tonnage of England in 1888 was about 500,000, and of France 318,000 tons. If America were at once to produce 369,000 tons of armour-clad ships of the newest designs, she would be more powerful than France, and, with all our additions since 1888, she would approach us in a formidable way." **New programme.**

The Naval Committee of the Senate has approved the construction of eight ironclads of 8,500 to 10,000 tons; two armoured coast-defence vessels; three gunboats, 800 to 1200 tons, and five torpedo vessels. The entire programme contemplated by the American Admiralty comprises 227 vessels, including ten battle-ships of

10,000 tons; twenty-eight second-class ironclads, 6000 to 8000 tons; seven monitors of 3600 to 6000 tons; ten rams of 3500 tons; one ram of 3000 tons; thirty-five cruisers of 3500 to 7000 tons; six cruisers of 1700 to 3200 tons; ten gunboats, sixteen torpedo-catchers, and 101 torpedo-boats.

Mr. Wilson's Summary.

The chief of the Naval Bureau of Construction and Repair, Mr. Wilson, in his Annual Report states that—

"With the completion of the vessels now building and appropriated for, the United States will possess ten armoured vessels, thirteen single-turreted monitors, twenty-one steel cruisers or gunboats, two dynamite cruisers, a practice cruiser for cadets, an armoured ram, one first-class torpedo-boat, and seventeen iron steamers."

Vessels by contract.

An armoured coast-defence vessel has been contracted for. Tenders have been invited for two cruisers of 2000 tons. Two cruisers of 3000 tons have been ordered. Tenders have been asked for two cruisers of 1050 tons, for a training vessel of 835 tons, and an armoured steel cruising monitor of 3130 tons.

The following detailed descriptions of the vessels enumerated by Mr. Wilson have been taken from the paper prepared by Lieutenant Singer, in the *Army and Navy Journal*, of New York:—

Protected cruisers.

"*Two Second-class Protected Cruisers.*—The principal dimensions are: Length, 300 ft. beam, 42 ft.; and displacement at a mean draught of 18 ft. is 3100 tons. Armament, one 6-in. and five 4-in. guns, six torpedo-tubes, six quick-firers, and two Gatlings. Contract speed, 19 knots; I.HP. 10,000.

"The complete protective deck, 2·5 in. on slope, has a double knuckle, and will have patent fuel stowed over inclined parts; above it at the water-line a coffer-dam, filled with woodite or other cellulose material, runs along ship's side.

"A steel conning tower is placed on topgallant-forecastle.

"The vessels will have double bottoms; will be rigged as two-masted schooners, and have a military top half-way up each mast; the rudder is balanced, and carries out the lines of the after-body of the ship. Bridges connecting the poop and forecastle are run on each side at rail.

Partially-protected cruisers.

"*Three Second-class Partially-protected Cruisers* (Nos. 9, 10, and 11).—To be of not over 2000 tons displacement. The vessels to be built of steel.

"The battery is composed of two 6-in. B.L. as bow and stern guns on topgallant-forecastle and poop, and eight 4-in. R.F.G. in broadside, the forward guns sponsoned for bow, and the after for stern fire. The light guns are two 6-pr. and two 3-pr. R.F.G., two 37-mm.

R.C., and two Gatlings. The torpedo tubes are one in bow and one aft, fixed, and two on each side, training.

"The contract speed is 18 knots for four consecutive hours, and the I.HP. 5400. The normal coal allowance is fixed at 200 tons, but the bunker capacity is 435 tons.

"A complete protective deck which has a thickness over vitals of 0·43 in. on slope, and 0·3 in. on flat; forward and aft the average thickness is 0·37 in. A coffer-dam, 15 in. wide, filled with woodite or other cellulose material, runs above the protective deck alongside of fore and aft bulkheads, its top 4 ft. above L.W.L. Athwartship bulkheads are worked from it to ship's side, forming a girdle of watertight compartments. A conning tower of 2-in. steel is placed on the topgallant-forecastle.

"The principal dimensions are: Length, 257 ft.; beam, 37 ft., and displacement 2000 tons, at a mean draught of 14 ft. 6 in. The rig is that of a two-masted schooner, with a small sail area.

"A steel practice vessel of 800 tons is to be built for use as a Naval Academy; the rig is that of a barquentine; speed under steam 13 knots; armament of light guns with a large proportion of quick-firers. **Practice vessel.**

"*Armoured Steel Monitor.*—Armament, 1·15-in. pneumatic gun in bow, 2·10-in. B.L. in a 10-in. armoured turret forward; auxiliary armament and 2 under-water torpedo-tubes; 7500 I.HP.; cruising speed 17 knots; complete armour, double sides and bottom. Principal dimensions: length, 325 ft., beam, 55 ft., displacement, 3030 tons; draught, 14 ft. 6 in. **Monitor.**

"*Cruiser, Vesuvius Type.*—Speed 21 knots on trial; coal endurance, 15 days at 10 knots; armament, two pneumatic guns 15-in. calibre. **Dynamite cruisers.**

"Two steel cruisers or gun-vessels are to have a displacement of 800 to 1200 tons; and to carry a powerful battery of heavy rapid-fire and machine guns, a large supply of coal, and a complement of 150 men. The speed will be 14 knots. Much attention has been paid to the quarters for officers and men. The main battery consists of eight 4-in. 33-pr. rapid-fire breechloading rifles. The secondary battery consists of two 47-mm. revolving cannons, two 37-mm. revolving cannons, one 1-pr. rapid-fire, and one Gatling gun. **Gun vessels.**

"*Coast Defence Vessel.*—This vessel is of the Monitor type, with a low freeboard, on the bracket system, having a double bottom along the entire length, and numerous watertight compartments. **Monitor.**

"The battery, as designed, is composed of one 16-in. 110-ton B.L.

in forward barbette, and one 12-in. 46-ton in the after one; one 15-in. pneumatic gun in bow; six 4-in. and some 6-pr. and 3-pr. R.F.G. The armour is of steel, and consists of a complete belt, with a maximum thickness of 16 in., tapering to 8 and 6 in. at ends. The barbettes have 16 and 14-in. armour, and a complete protective deck has a thickness of 3 in. over vitals and 2 in. at ends. The conning tower has armour of 10 in. and the base of smoke-pipe 6 in.

"The principal dimensions are: length, 250 ft.; beam, 59 ft.; and displacement, 4000 tons at a mean draught of 14 ft. 6 in. The speed is to be 16 knots.

"The bow is ram-shaped. One military mast is placed abaft the smoke-pipe. The complement is to be 17 officers and 150 men.

Vessels laid down in 1889.

"The following vessels were laid down in 1889.—The turret ship Texas, 6300 tons, designed by Mr. W. John, general manager of late Barrow Shipbuilding Company, to carry two 12-in. and six 6-in. breechloading rifled guns, and a powerful secondary battery and torpedo armament, was commenced at the Norfolk Navy Yard; and the armoured cruiser Maine, an improved and enlarged Riachuelo of 6648 tons, to carry four 10-in. and six 6-in. breechloading rifled guns, a powerful secondary battery, and seven torpedo-tubes, was laid down at the New York Navy Yard. Five other vessels were laid down at private yards. The Newark, protected cruiser, of 4080 tons, keel laid in June, 1888; machinery to be built on contractors' designs; the Philadelphia, 4324 tons, keel laid in April, 1888; a protected cruiser very similar to the Baltimore, hull and machinery to be built on contractors' own designs; the San Francisco, 4083 tons, hull and machinery on Navy Department designs; and the Concord and Bennington, sister ships to the Yorktown."

Secretary of the Navy's Report.

Reprinted from the Army and Navy Gazette, New York.

In his annual report Secretary Tracy shows that when all the ships authorised by law are completed we shall have but forty-two vessels, and be at the bottom of the list, following in this order: Austria, 56; Sweden and Norway, 64; China, 73; Turkey, 81; Italy, 86; Spain, 90; Holland, 94; Germany, 105; Russia, 168; France, 260, and England, 367. This will not give us rank as a naval power. As our purpose is defence, not conquest, the Navy should be as small as possible, but we should not be left at the mercy of states having less

Object is defence, not conquest.

than one-tenth of our population and one-thirtieth of our wealth. Our coast line of 13,000 miles is wholly unprotected, and half the amount that might be wrested from us in a single raid, judiciously expended, would give us a guarantee of perpetual peace.

"The defence of the United States absolutely requires the creation of a fighting force. So far the increase has been mainly in the direction of unarmoured-cruisers. These vessels, while useful in deterring commercial states from aggression, and as an auxiliary to secure celerity and efficiency in larger operations, do not constitute a fighting force even when it is intended exclusively for defence. To meet the attack of ironclads, ironclads are indispensible. To carry on even a defensive war with any hope of success we must have armoured battle-ships. The capture or destruction of two or three dozen or two or three score of merchant vessels is not going to prevent a fleet of ironclads from shelling our cities or exacting as the price of exemption a contribution that would pay for their lost merchantmen ten times over. We must do more than this. We must have the force to raise blockades, which are almost as disastrous to commercial cities as bombardment. We must have a fleet of battle-ships that will beat off the enemy's fleet on its approach, for it is not to be tolerated that the United States, with its population, its revenue, and its trade, is to submit to attack upon the threshold of its harbours. Finally, we must be able to divert an enemy's force from our coast by threatening his own, for a war, though defensive in principle, may be conducted most effectively by being offensive in its operations.

Creation of a fighting force.

Ironclads necessary.

"If the country is to have a Navy at all, it should have one that is sufficient for the complete and ample protection of its coast in time of war. If we are to stop short of this, we might better stop where we are, and abandon all claim to influence and control upon the sea. It is idle to spend our money in building small, slow-going steamers that are unnecessary in peace and useless for war. It is a little better than a repetition of the mistaken policy that prevailed in our early history, of building gunboats that were laid up or sold as soon as war broke out. The country needs a Navy that will exempt it from war, but the only Navy that will accomplish this is a Navy that can wage war.

Navy should be sufficient.

"The cost of building a Navy casts no perceptible burden upon a country of our vast resources. It is the premium paid by the United States for the insurance of its acquired wealth and its growing industries. Compared with the interests that are secured, the rate is low. It is a cheap price to pay for safety. We collect in duties in

Cost is not a burden on the country.

six months at a single port a greater sum than we could spend in building a new Navy in six years. For the past two years the Government has paid its creditors for the privilege of discounting its debt before it was due, twice the sum we have spent in reconstruction. And the fact must be remembered that of the amount which we spend for the construction of a ship, only a small fraction, perhaps one-tenth, goes for absolutely raw material, while the remaining nine-tenths represent, in one form or another, the earnings of American labour.

War-ships cannot be improvised.

"Under the most favourable circumstances, with the largest experience and the best mechanical appliances, the construction of war-ships takes a long time. If Congress were ready to-day to authorise the construction of all the ships that we need, it would be a mechanical impossibility to furnish them within fifteen years; while the first six months of hostilities would not only see our exposed cities forced to submit to heavy contributions, but every shipyard in the country, public or private, destroyed, and thus the last hope extinguished of creating a Navy to meet the emergency of war.

New cruisers.

"In looking back at the work of naval reconstruction, begun seven years ago, the country has reason to be congratulated on the success of the undertaking. The results accomplished with the earliest cruisers compared favourably with those obtained by foreign shipbuilders. The Boston and Atlanta have made cruises, and their performance at sea shows that they are thoroughly staunch and seaworthy vessels in all weathers, and although it is possible that the world may have contained, at the time they were designed, a very few swifter cruisers, their high efficiency can no longer be called in question. The record of the Dolphin, which vessel began with a speed of 15·11 knots on her contract trials, and which has recently returned from a cruise around the world, is not less satisfactory. In the course of her cruise the Dolphin has run 58,000 miles in twenty months, and has been under steam 9000 hours. In this prolonged run she has been stopped for repairs but once, and then for only two hours. This performance is probably without a parallel in the history of naval achievements, and bears conclusive testimony to the high skill of American artisans and the excellence of their work. Nor is it the less remarkable, in view of the confident predictions with which, at the outset of her career, the official condemnation of the vessel was somewhat prematurely pronounced by experts and by inexpert judges. It is therefore proved by the test of actual cruising that these first modern experiments of the Department have come close to the highest standard of speed which had been reached at

Boston and Atlanta.

Dolphin.

the date of their design, and that in structural strength, endurance and workmanship they are not inferior to anything now afloat.

"In view of these facts, the extraordinary statement, put forth in the Secretary's report for 1886 and never afterwards corrected, that a comparison of these vessels with the Esmeralda and other foreign ships indicates 'a simple abandonment on the part of the Department of any attempt to reach the conditions which should have been attained,' must be set down as a mere flight of political rhetoric, absolutely without warrant or justification. If the Department requires any vindication from such a charge, its complete vindication is to be found in the vessels themselves.

Naval Intelligence Department.

"The establishment of the Office of Naval Intelligence and the assignment of naval *attachés* to duty in Europe, both of which measures date from 1882, have been of incalculable assistance in the work of re-construction; and it is proper to refer especially to the untiring and successful efforts of Comdr. F. E. Chadwick, the first *attaché* sent out, whose extraordinary ability and judgment during six years of difficult service in England and on the Continent have had a lasting influence upon naval development in this country. The results subsequently obtained have shown the wisdom of the policy adopted at the outset.

Commander Chadwick.

"The importance of a knowledge of progress abroad was increased by the rapid strides which it made during this period. In 1882 the compound engine was the highest development of marine engineering in practice. In 1885 the keels were laid of the first ships of war provided with triple-expansion engines. Of this extraordinary development in ship and engine construction, by which between 1882 and 1885, the art was almost revolutionised, the attainment of high speed made practicable, and the standard speed advanced from 16 to 20 knots, the Department was thus able to reap the full benefit.

Baltimore.

"In all respects the Baltimore has proved thoroughly satisfactory. An undue vibration about the forecastle during the working of the engines has been remedied by heavier bracing, at inconsiderable cost. This temporary "structural weakness" was not the fault of the contractor, but of the plan. Material improvements were made in the ship's engines during the progress of construction, and she appears to-day a sound, strong and well-built vessel, creditable to her builders alike in honest material and honest workmanship, and creditable no less to the administration of the Department which adopted the design and carried it to successful completion.

Petrel.

"The ignorance or inexperience of the contractors, in the case of

the Petrel, was such that the trial cannot be regarded as a fair indication of what the vessel can do. The Italian cruiser Piemonte, in a trial on May 14, 1889, developed 13,000 horse power, and her two runs over the measured mile showed an average speed of 22·3 knots. She is undoubtedly the fastest cruiser now afloat, as the Esmeralda was five years ago; and she bears to the United States cruisers about the same relation in comparative speed that the Esmeralda did to the first three cruisers.

"It is notorious that the fast war steamers abroad, of whose wonderful performances on contract trials we hear so much, rarely or never equal these results when put into actual service, and not infrequently commanding officers have been instructed not to attempt to obtain contractor's results for fear of further injury to the machinery.

"The net results of the Department's operations for the last seven years are more than satisfactory. The assaults made, with more audacity than judgment, upon the four experimental cruisers of 1882 have been met successfully by the performance of the vessels, and all doubts of their efficiency, if such doubts ever really existed, are laid at rest for ever; while the four cruisers of 1886, assuming that the Petrel will eventually come up to the mark, in their advance over their predecessors, prove that both designers and constructors have kept themselves abreast of the extraordinary development in shipbuilding since the earlier cruisers were laid down, and have taken full advantage of the information and experience which they were enabled to acquire through the measures adopted at that time by the Navy Department.

Increase of the Navy proposed.

"To stop now in the work of reconstruction, is to abandon everything we have gained. We have proved that at a time when war-ship construction had seemed almost a lost art in this country, American mechanics could create it anew, and place the United States where it was seventy years ago, when the vessels of its Navy were the best of their class afloat. We have fostered and developed a branch of industry in America which may, if kept up, attract to itself no inconsiderable share of the profits that now go to ship-builders abroad. We have secured for our Navy a certain number of excellent and useful vessels of the unprotected cruiser type at a fair and reasonable cost. We have thus laid a solid foundation. But we must not for a moment deceive ourselves by supposing that we have an effective Navy. We have two distinct and widely separated ocean frontiers to protect, and there is only one way in which they can be protected.

"The necessities of our vulnerable position therefore demand the immediate creation of two fleets of battle-ships, of which eight should be assigned to the Pacific and twelve to the Atlantic and Gulf. They must be the best of their class in four leading characteristics; armament, armour, structural strength and speed. The last is nearly as essential to the battle-ship as it is to the cruiser. It may safely be assumed that, other things being equal, the battle-ship of the highest speed will as a rule be the victor in action, for she can choose her position and keep the enemy at a disadvantage. Not only must the speed of our battle-ships be high, but it must be uniformly high, for the speed of the fleet is regulated by that of the slowest vessel.

Creation of two fleets—twenty battle-ships.

"In addition to the battle-ships, the situation of the country requires at least twenty vessels for coast and harbour defence. They should have a powerful battery and the heaviest of armour, combined with moderate draft. At the present time eight vessels of this type are under construction, five of which are reconstructed monitors.

Twenty coast-defence vessels.

"The one problem now before the Government, in the matter of a naval policy, is to get these forty vessels built at the earliest possible moment. Using the utmost promptness, the ships most essential to efficient protection could not be supplied in less than twelve or fifteen years. It is therefore recommended that the construction of eight armoured vessels be authorised at the coming session, and that they be of the type of battle-ships rather than coast-defence ships; the former being more generally serviceable, and there being only three of them now in process of construction as against eight of the latter.

Government policy.

"In reference to fast cruisers, all modern experience goes to show that they are essential adjuncts of an armoured fleet, and the proportion of three cruisers to one battle-ship is believed to be sound and reasonable. This would make the future Navy consist of 20 battle-ships, 20 coast-defence ships, and 60 cruisers, or 100 vessels in all, which is believed to be a moderate estimate of the proper strength of the fleet. Of the 60 cruisers required, 31 are now built or authorised. For an increase in the number of cruisers, considered simply as auxiliaries to the fighting force of battle-ships, we may wisely wait until the latter are in process of construction.

Proportion of fast cruisers.

"It is a matter for serious consideration whether steps may not be taken towards the creation of a fleet of specially adapted steamers of American construction, owned by American merchants, carrying the American flag, and capable, under well-defined conditions, of temporary incorporation in the American Navy. The advantages of such an arrangement, which enlarges the merchant marine and makes it at the same time self-protecting, are overwhelmingly great.

Merchant steamers as auxiliary cruisers.

The difficulty is that American capital will not be drawn into the enterprise unless it can be sure of specific compensation for the concessions which it makes to the Government. Our deficiency should be thus supplied, or we should build a fleet of at least five first-class cruisers of the very highest rate of speed, certainly not less than 22 knots, and not less than 4000 tons. Even such a fleet will not supply the want of swift merchant steamers for coaling and transport service.

Alternative.

Small cruisers.

"In determining the size of the smaller type of cruisers, one point is settled: All steel cruisers must be large enough to admit of a double bottom. A vessel like the Yorktown, which has but three-eighths of an inch of steel on her bottom, could hardly escape sinking if she touched a rock, no matter how lightly.

Gunboats.

"In reference to the gunboat class, any large increase in it must be condemned. Such vessels add nothing to the real strength of a naval force. They have neither the strength to fight nor the speed to run away. A limited number of 1000-ton vessels can be utilised in certain special kinds of service on foreign stations, and for this particular purpose it is recommended that three such vessels be constructed.

Torpedo-boats.

"Apart from the want of battle-ships, the most marked defect of the present fleet is in torpedo-boats. The number of these boats owned by fifteen foreign States is as follows: England, 207; France, 191; Russia, 138; Italy, 128; Germany, 98; Austria, 60; Greece, 51; Turkey, 29; China, 26; Denmark, 22; Japan, 21; Sweden and Norway, 19; Holland, 16; Spain, 15; Brazil, 15. The United States has one such boat under construction. This branch of defence cannot safely be neglected any longer. I therefore recommend that the construction of at least five torpedo-boats of the first and second classes, in suitable proportions, be authorised, as a beginning, at the coming session of Congress.

Single-turreted monitors.

"The Bureau of Construction recommend, with reference to the single-turreted monitors, that some action be taken looking to the reclaiming of these vessels from 'their present worse than useless condition.' In view of the fact that the amount necessary for this purpose will reach about £80,000, and that the vessels, with their present effective guns, will be no material addition to the force of the Navy, the Department cannot concur in this recommendation. The only use to which these vessels can be advantageously put is to assign them to service as practice ships for the naval reserve in those States which have created such a branch of the militia, should they be desired for the purpose.

Naval Reserve.

"The question of the creation of a Naval Reserve demands the early attention of Congress. This reserve should be composed of ships, officers, and seamen. Congress has as yet failed to pass any law on the subject, but the Legislatures of several States, taking the initiative, have made arrangements for the creation of a Naval Militia. In so far as these measures require the co-operation of the U.S. Government, I am heartily in favour of giving it. Where stationary vessels are desired for purposes of gunnery training, I recommend that the Department be authorised to furnish such vessels as are now laid up, unfit for sea service, to States making provision for a Naval Militia, upon their request. Authority should also be given for the issue of arms, and such legislation should be adopted by Congress as is necessary to give the new system vigour and efficiency.

Construction in private yards to be preferred.

"On the broad question, which arose in the case of the two 3000-ton cruisers, of the comparative advantages of the two systems of naval construction, the first in the Government yards and the second by contract with private firms, the Department is firmly of the opinion that the latter is the best method. The importance of encouraging private enterprise in this direction and of creating and developing one of the most valuable and useful industries to which American labour and capital can be devoted, is sufficient to turn the scale, provided that the results obtained are equally good. The success of the experiments made thus far in constructing modern ships by contract proves conclusively that our private works and workmen have the skill and talent to give the Navy as good ships as the world affords.

"It may reasonably be expected that as shipbuilding in America is gradually improved and cheapened, additional private business will be attracted to these growing establishments, until in time the world's market for ships will be divided between this country and Europe. All these advantages are lost by a policy that confines the construction of vessels exclusively to the Navy yards. Still, it is advisable that the Navy should build some of its ships. The number of private concerns is so small that circumstances might readily arise which would place the Department at the mercy of combinations. The Government should have at its command the skill and the plant for building its vessels occasionally, and for repairing them at all times. For this purpose its own officers must have practice in carrying out their designs through all the stages to the finished product. There is no inherent reason why building in the Navy yards should not be as well done as by any other process, and at approximately the same cost.

Building in Navy yards.

The Government ship-building establishments.

"The present administration of the Department finds itself handicapped by the tumble-down condition of the Navy-yard property. I propose to adhere rigidly to a policy of economical administration; but I do not propose to shirk the task of keeping the Navy-yard property in a decent state of repair merely for the sake of showing a creditable balance sheet. A vast quantity of stores have been allowed to accumulate at the Navy yards; nominal value on June 30, 1888, £3,000,000. A large part of them are useless. These should be sold, and out of the proceeds of sales the sum of £110,000, being the amount by which the expenditures of 1886–88 for yards and docks were reduced below those of 1882–84, be reappropriated.

"The suggestion that the naval station at Port Royal, S. C. be provided with a dry dock and other necessary facilities for docking vessels is heartily approved.

"Whatever policy may be adopted by Congress in reference to new navy yards, or to the re-opening of those that are now closed, any extension of the existing system should be made with caution. Navy-yard officials tend naturally to a magnified view of their wants in the matter of improving the property in their charge, and do not feel the restraints which a closer margin of profits imposes on a private manufacturer.

"The number of military posts for naval purposes is none too large, but the number of workshops should be limited strictly to actual necessities, otherwise enough millions will in a short time have been spent to build the best navy in the world, with nothing to show for it but a large number of imposing but unnecessary shore establishments.

"A like progress has been made in naval administration. The establishment of the Office of Naval Intelligence adds the employment of trained observers abroad in connection with it; the foundation of the War College, which has developed the study of problems of modern warfare in a manner at once scientific and practical; the consolidation of stores and accounts; and, it may be hoped, the introduction of unity of administration into the management of the fleet and of unity of purpose into the bureaus concerned in ship design, armament, engineering, and equipment, are important steps in the direction of reform."

Austria.

Franz Josef.

The Franz Josef, launched at Trieste in May, 1889, is an important addition to the Austrian Navy. The heavy guns consist of two 27-ton Krupps, mounted on barbettes 6 feet 4 inches high, with 3½-inch armour protection placed at the ends with a superstructure

between. In the battery are six 6-ton Krupps mounted on sponsons, one on each side on the upper deck between the barbettes, with bow and stern fire, and two on each broadside on the lower deck, the forward with bow, the after with stern fire. Eleven Hotchkiss guns are carried, and several torpedo-tubes. Estimated speed, 17·5 knots with natural and 19 with forced draught; coal capacity, 660 tons; complete protective deck, 2·24 inches thick, having above it in wake of machinery a cellulose belt. The vessel is built of steel, has two military masts, and a powerful ram-bow. Length, 321 feet; beam, 48 feet 7 inches; mean draught, 18·7 inches; displacement, 4000 tons.

The Archduchess Stephanie has undergone trials, and realised a speed of 16 knots with natural draught and 17 knots forced draught. Protected by an armoured-steel belt, tapering from 23 to 18 cm. Armour on the turrets, 203 mm.; and on the armoured-deck, 25 mm. Armament, two 30·5-cm. or 48-ton Krupp guns in turrets; six 15-cm. and thirteen quick-firers. Archduchess Stephanie.

The ironclad, Archduke Rudolf, now building will be somewhat more powerful than the Archduchess Stephanie. Archduke Rudolf.

Austria has in construction two protected cruisers of 4000 tons like the Franz Josef; a monitor for the Danube; and a torpedo-sloop of 480 tons and 20 knots speed, called the Trabant.

The Austrian Navy Estimates amount to a total of £562,238 for the ordinary, and £94,460 for the extraordinary expenditure. Of this total, £145,000 are proposed to be spent on a new cruiser, and £10,000 on torpedo-boats. Six hundred and ten additional men are asked for, making the total peace effective 7500 men. Navy Estimates.

CHILI.

In October, 1887, the Government of Chili appointed a Naval Commission, under the presidency of Rear-Admiral Latorre, to determine the naval requirements of the State, and devise a programme of new constructions, having in view the latest developments and designs in England, France, and Germany.

The Commission eventually concluded to have constructed in Europe one 6000-ton armoured vessel, two fast cruisers, two gunboats, and two torpedo-vessels, and in March, 1888, outlines were given to ship designers and builders in England, France, and Germany, and they were invited to submit plans. Programme.

The requirements in regard to the armoured vessel were as follows: The armament to be composed of four 24-cm. (9·45-in. The ironclad.

B.L. in barbettes or cupolas, and six 15-cm. (5·91-in.) B.L. The hull protection to be a complete steel armour water-line belt and a protective deck. The required speed was 17 knots with natural draft, and the coal capacity was to be large enough to give a steaming radius of 7000 miles at 10 knots. Latitude was given as to arrangement of the heavy guns, but preference was expressed for four positions, or the French system of distribution.

During May, 1888, nineteen plans were submitted by English, French, and German designers; in all of these the limits of displacement (6000 tons) was exceeded. The French influence, foreshadowed above, prevailed with the Commission, and all designs having the large guns in pairs, either in turrets or barbettes, were rejected; the French design of the Société des Forges et Chantiers de la Méditerranée made thin side-armour allowance for detonating shell and R.F.G. fire, and this design, somewhat modified, was given out in February, 1889, for ship builders to base their estimates on when submitting tenders for building.

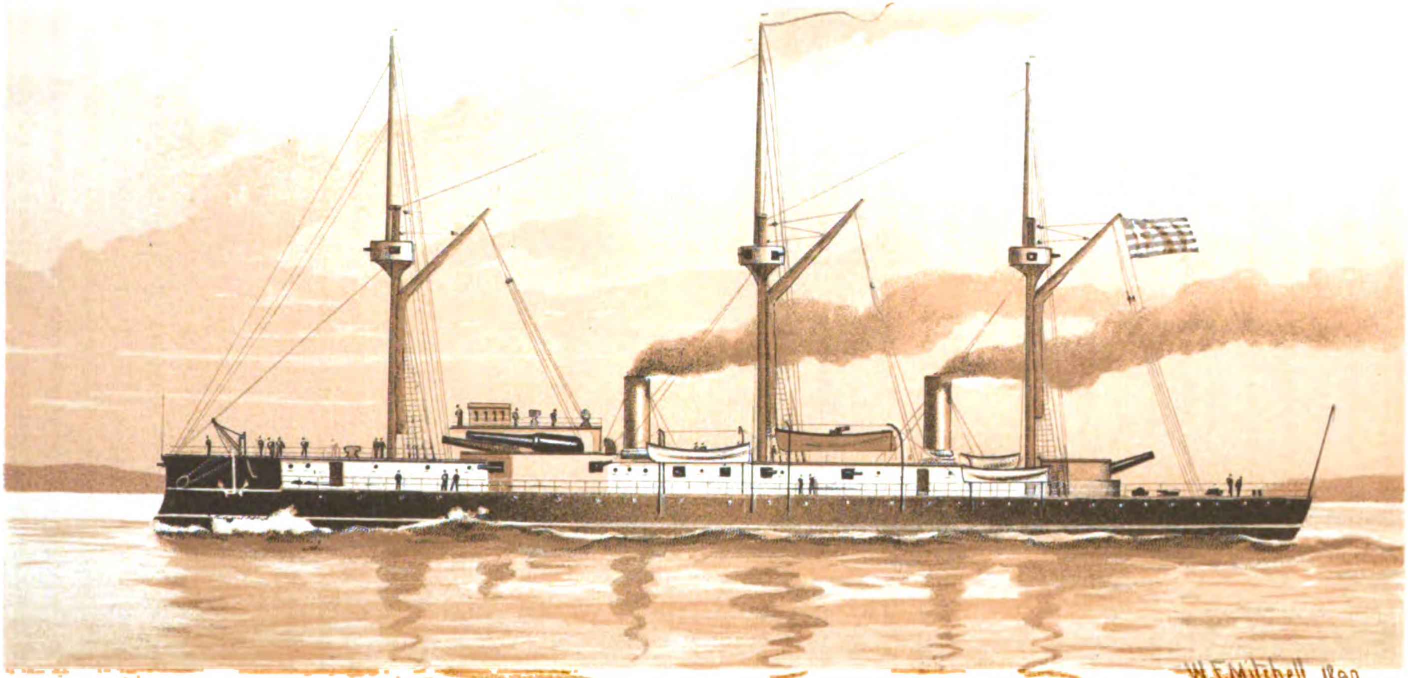
Armament. The four 9·45-in. guns (see *Pl. 41*) are arranged on the French plan; instead of six 6-in. there are eight 12-cm. (4·72-in.) B.L. guns placed in pairs in light turrets on forecastle and poop.

Machinery. The estimated speed is 17 knots with natural and 19 knots under forced draft; the corresponding I.HP. is 8000 and 12,000. The protection for the hull consists of a complete steel water-line belt, over 6 ft. 5 in. wide, with a maximum thickness of 11·8 in.; a complete protective deck, and a light central redoubt covered with armour 3·94 in. thick and 134 ft. 6 in. long; all armour is Creusot steel.

The principal dimensions of the vessel are: Length, 328 ft.; beam, 60 ft. 8 in.; depth to upper-deck beams, 35 ft.; mean draught 21 ft. 10 in. with a displacement of 6901 tons. The weights to make up this figure are:—

	Tons.
Hull	2,240
Crew, equipment, and stores	343
Armament	665
Armour, including protective deck	2,108
Machinery, main and auxiliary	1,145
Coal	400
	6,901

Firms tendering. Twelve shipbuilding firms tendered for this vessel; of these seven were English, two German, and three French; the lowest tender was made by the Earle Shipbuilding Company, of Hull, England, the next to them by the Société des Forges et Chantiers de la Méditerranée; and the French firm received the contract to build the ship for £391,000.



GRIFFIN & Co. PORTSMOUTH.

"SPETSIA."
GREEK ARMOUR CLAD SHIP.

The contract for building two protected cruisers was given to the same firm. They are small vessels, carrying four 15-cm. (5·91-in.) and two 12-cm. (4·72-in.), all French type, 36-calibre B.L. Three torpedo-tubes are to be mounted, and the auxiliary battery numbers four 57-mm. Hotchkiss R.F.G., four 37-mm. R.C., and two 11-mm. Gatlings. Protected cruisers.

The contract speed is 17 and 19 knots, natural and forced draft; the corresponding I.HP. 3550 and 5400. Horizontal triple-expansion engines work twin screws; four 3-furnace boilers supply the steam. The estimated steaming radius is 4500 knots at a speed of 12 knots. Machinery.

The vessels are to be built of steel, and have protective decks with cellular belts or coffer-dams; they were originally designed with sail power and a speed of 16 knots, but masts and yards were given up for greater steaming speed.

The principal dimensions are: Length, 268 ft. 4 in.; beam, 35 ft. 9 in.; depth, 23 ft. 5 in.; mean draught, 14 ft. 5 in., with a displacement of 2080 tons. Both vessels are to be sheathed.

The two gun-vessels are to be of about 800 tons displacement. They have also been given to the Société des Forges et Chantiers de la Méditerranée to build. Gun-vessels.

The two torpedo gunboats are of the English Sharp-shooter type, of about 735 tons displacement, and are ordered in England from Laird Bros., at Birkenhead. See particulars in Part II. of this volume. Torpedo gunboats.

Greece.

The Government of Greece some time ago applied to that of France for the assistance of experts to serve on a Commission to formulate a building programme to strengthen the Grecian Navy, and to design vessels of the type required. The French Admiral Lejeune was in consequence placed at the head of this Commission, and was assisted principally by the constructing engineer, Mr. M. Dupont.

Two second-class battle-ships, the Spetsia and Psara, were ordered from the Société des Forges et Chantiers de la Méditerranée. The contract for the third vessel of the same type, the Hydra, was sublet to the Société des Ateliers et Chantiers de la Loire, and she was launched at their St. Nazaire yard on May 15, 1889. The Spetsia was launched on the 26th October, 1889, and the Psara on the 23rd January, 1890. Spetsia. Psara. Hydra.

The battery is composed of two 27-cm. (10·6 inch) B.L. of 36 calibres in barbette, one each side, on top of an armoured casemate in forward part of ship; and one of 30 calibres length in a circular Armament.

armoured barbette aft; four 15-cm. (5·91-inch) B.L. 36 calibres, are mounted in the four corners of the casemate, and one in barbette above it, on forward part and between the heavy guns. Three torpedo-tubes are fitted, one in bow and one in each broadside. The auxiliary battery comprises seven 57-mm. R.F.G., and sixteen 37-mm. R.C.

Machinery. The horizontal triple-expansion engines are to develop 6700 I.HP. under forced draught, and the estimated maximum speed is 17 knots. The protection consists of a complete water-line belt of Creusot steel of 11·8 inches maximum thickness, tapering to 4·72 inches; a

Armour. casemate, nearly rectangular in shape, with 13·7 inches of armour, and 11·8 inches on the barbette aft. The complete protective deck is of four thicknesses of half-inch plates, or two inches in all. Above the armour belt is another belt 2·95 inches thick for protection against detonating shell. The armour for this and the protective deck is from the firm of Châtillon et Commentry. Behind the side armour is a cellular coffer-dam, and the coal-bunkers are next to this. The hull is divided into 118 water-tight compartments.

The vessel is built of steel, has a ram-bow, and is fitted with three military masts.

Holland.

The Dutch Chamber adopted the naval budget last December and authorised the construction of one small armoured vessel of the Monitor type for river service in the Indian Netherlands.

The Minister of Marine has drawn up a programme for improving the Dutch Navy, which provides for four armoured vessels and sixteen torpedo-boats.

Japan.

Vessel ordered. The Shiodo was ordered last year from Messrs. Thomson, of Glasgow, to replace the lost Unebi. The principal dimensions are: Length, 300 feet; beam, 41 feet; displacement, 2400 tons. The armament is composed of eleven 12-cm. (4·72-in.) B.L. and three torpedo-tubes. The contract speed is 19 knots, and the coal capacity 240 tons.

Vessel launched. The Metsuchima was launched on the 22nd of January at La Seyne. The vessel was laid down in November, 1887: Length, 325 feet; breadth, 51 feet; depth, 34 feet 9 inches; draught of water, 21 feet; displacement, 4277 tons; 5400 I.HP.; speed, 16 knots. The Metsuchima, like the sister ship the Itsukusima, will carry no side armour, but the protection will be by an armoured deck and water-tight bulkheads. Armament, one 32-cm. Canet gun

in an armoured barbette, 12-cm. quick-firers, eleven machine guns, and four torpedo-tubes.

The dispatch vessel, Yaeyama, built by the Japanese Government at the Yokosuka yard, was launched in the early part of this year. Yaeyama.

Three 12-cm. (4·72-in.) B.L., six machine guns, and two torpedo-tubes form the armament. The estimated speed is 20 knots, and the I.HP. 5400 under forced draft. The principal dimensions are: Length, 315 feet; beam, 34 feet 6 inches; depth, 15 feet 5 inches; displacement, 1600 tons at a mean draught of 15 feet.

SPAIN.

It is reported from Madrid, that in deference to financial considerations, the new Minister of Marine in Senor Sagasta's Cabinet has effected considerable reductions in the Navy Estimates. Three armoured-cruisers are building in the Government dockyards, and three have been ordered to be built by contract by the Anglo-Spanish firm of Martinez de las Rivas and Palmer Shipbuilding Company, of Bilbao. The price for the three vessels is £1,800,000, or £600,000 each; the first is to be delivered two years from date of contract, the second six months later, and the third six months after the second. The speed is to be 18 knots with natural and 20 knots under forced draught. The weight of armour for each ship is about 1000 tons. As the English firm has to buy the armour in England, it is to be compound. The contract for furnishing the armour for one and the propeller-shafts for all three was placed with Messrs. John Brown and Co., of the Atlas Works; the armour for the other two is ordered from Messrs. Charles Cammel and Co.'s Cyclops Works. The expenses of the armour tests are to be shared by the Government and the contractors. The principal dimensions of the vessels are: Length, 365 feet; beam, 65 feet; depth, 38 feet; displacement, 7000 tons at a mean draught of 21 feet.

Six armoured-cruisers building.

English armour.

A school-ship of about 3000 tons, was ordered by Royal decree to be built at Ferrol. She is to be used for the instruction of naval cadets, and will take the place of the Blanca. School-ship.

A gun-vessel named the Temerario, laid down in 1887, was launched at Cartagena in 1889. Displacement, 571 tons; estimated speed, 17 knots. Armament torpedoes and quick-firing guns. Temerario.

TURKEY.

On the 30th of January five war-vessels were launched at Constantinople—a corvette, a torpedo-catcher, and three small craft.

CHAPTER XII.

DESCRIPTIONS OF SHIPS LATELY COMPLETED AND IN HAND, TRIALS, &c.

ENGLAND.

Battle-ships.

HAVING dealt with programmes of construction generally, we proceed to the examination of the most important types of vessels which have recently been added to the fleets of the great maritime powers. We will begin with the British ships. The Admiral class was well represented at Spithead last year by the five ships, Collingwood, Howe, Anson, Camperdown, and Rodney.

Admiral class.

Strongly condemned as these ships have been for insufficiency of protection at the belt, it may be claimed that important elements of fighting efficiency have been ably combined in their design. The measured mile speed is 16·75. It is a speed not previously reached in any battle-ship, and the Admirals have the merit of coming nearer to their trial speed in active service than is usual in our vessels of war. The coal endurance is over 7000 knots. As to the formidable character of the armament there cannot be a question. It must be admitted that the Admiral class are deficient in armour protection. The weakness is most serious in the absence of broadside armour for the central secondary battery and in the exposure of the heavy guns mounted *en barbette* to blows which might throw the gun or its mountings completely out of action. Keeping, as it was most desirable to do, within the limits of displacement of the Collingwood, it might have been well to accept a reduction in the calibre of the heavy guns and in the thickness of the barbette armour. The saving in weight might have been sufficient to provide for the protection of the central battery. Unprotected as they are on the side at present, it is difficult to believe that men could stand to the 6-in. guns under a heavy fire from the protected battery of an enemy. To advocate

reduction in weight of armament and increased weight of armour is against the popular instinct; yet high authorities support the view that in the rivalry created by competitive firing at targets, the only test applicable in time of peace, the exigencies of battle have been forgotten. If we have a gun which can penetrate any armour to which it is likely to be opposed, it is better to go for an increase in the number than an enlargement of calibre. So, too, it may be better to give protection to the gun's crew than to carry a gun of heavier calibre and leave the crew exposed to destruction by melinite shells and the hail of fire from the quick-firing guns.

Deficiency of Freeboard.

The Admiral type cannot be dismissed without allusion to the defect already so frequently noted in this review. The Admirals are too low forward. In ordinary weather they will keep their speed. In the Atlantic the constant shipping of heavy water puts a strain on the decks. In heavy weather it would be necessary to ease down.

M. Weyl's opinion.

The deficiency of freeboard attracted the special attention of M. Weyl on the occasion of the inspection of the British Fleet at Spithead. In the report which he published in *Le Yacht*, in its issue of the 31st August, 1889, he said: "The Admirals are at first sight, in every particular, powerful ships; nevertheless, I cannot but think them inferior to our first-class ironclads of equal displacement. Externally these ships have points of resemblance with our Furieux type, that is to say, that both forward and aft they are ships of low freeboard, and have a commanding fire in all directions from their towers. The disadvantages inseparable from this mode of construction are obvious. In a heavy sea men cannot remain on the deck forward, and the working of the anchors is difficult, if not dangerous. As the sea rises it beats against the forward barbette, and scatters a mass of foam and spray, which makes the working of the guns extremely difficult. *A priori* the opinion which the seaman must form of these vessels must be such as I have described, and in the subsequent experiences of the manœuvres the anticipations which have been indicated were fully confirmed." In support of the remarks which have been quoted from M. Weyl, reference may be made to the graphic description by the newspaper correspondent on board the Collingwood of the voyage in that ship round the north of Scotland and through the stormy channel which divides the Shetlands from the Orkneys.

To return to the criticisms of M. Weyl. "It is," as he says, "very well not to burden the bows of a ship with a heavy superstructure, and to have an unobstructed arc of training for the guns; but it must

not be forgotten that a ship should be thoroughly seaworthy as well as an instrument of war. If a ship steers badly; if from defective fittings she cannot keep the sea; if the working of the ship and the guns becomes difficult as soon as bad weather comes on; if, finally, it is necessary to ease down the engines considerably as soon as the sea rises, it must be said that such a ship is of an inferior type. The facts which have been noted have not escaped the attention of the British officers, and it has been sought to introduce improvements in the vessels of more recent construction."

M. Weyl's opinion of the Jemappe's class.

"It is to be regretted," says M. Weyl, "that the efforts in naval construction in France are again to be bestowed upon the coast-defence type, that is to say, vessels with low ends. We are about to lay down four which will never possess the good qualities which we have secured in our first and second-class ironclads of high freeboard. Our new ironclads will have the advantage, it is true, of the moderate displacement of 6790 tons. With their two 34-cm. guns mounted in a barbette they will be strongly armed; they are to have thick armour at the water-line, and a speed of 16 knots. It may appear that such a type is a successful achievement in naval construction; but we must ask ourselves for what service vessels of the type described will be found useful. If coast defence is in contemplation, a high speed is not essential; if they are intended for service on the open ocean, it would be well to remedy the obvious deficiencies in point of seaworthiness."

Victoria and Sans Pareil.

The Victoria and the Sans Pareil are the latest British ships completed for sea. They are fully described in the *Naval Annual* for 1888–89, Chap. V. Part I.

Compiler's opinion.

During the proof at Woolwich, one of the two 110-ton guns for the Victoria was found to have bent; steps have been taken to remedy this defect, but it is believed to be the decision of the Admiralty not to build any more guns of the same type. The compiler cannot express entire satisfaction with the Victoria. The primary idea was to build some fighting ships for the Navy of moderate dimensions and cost: it was desired to introduce a type of which at least two could be built for the cost of a single Inflexible. The leading idea having been accepted, it was natural to turn to the Conqueror as our latest example of a second-class ironclad which had recently made a highly successful steam trial. If the type of the Conqueror, with modifications, had been adhered to, we should at least have had the advantage of keeping down the cost, and building double the number of ships for the given amount of money at our disposal. When, however, the Conqueror type was taken as the

basis for a design with the view to introduce into it the latest improvements in armour and armament, the history of design for the shipbuilding of the British Navy repeated itself. It was asked: Do you propose to build any ships for British line of battle with less armour than the thickest with which ships of foreign powers are protected, and with guns of less power than the most powerful that are to be found elsewhere? Thus it was that step by step the Conqueror grew up into the Victoria, a type in which, while the cost and the tonnage have been brought up to those of a first-class ship, we have this grave disadvantage, that the main armament of the ship is concentrated in a single turret. The deficiency of freeboard forward is another capital defect. At the date when the Victoria was laid down this point was less considered than it ought to have been. The American monitors proved a highly successful type for the work they had to do. Following the American monitors we had advanced to the Devastation. The naval mind was deeply impressed with the superiority in fighting power of the low and heavily-armoured ships over the older types with lofty sides and thin armour, and more especially in a conflict fought under the conditions as to armament which obtained when the Devastation was laid down, and when the armaments consisted of a few heavy guns unsupported by the auxiliary ordnance which has since been introduced. There were no manœuvres in those days. The loss of speed, consequent on the low freeboard when contending with contrary seas, and the misery of life on the lower deck, battened down at sea, were not sufficiently brought home by practical experience in cruising. It must, however, be admitted that these defects had from the first been insisted upon by French writers and constructors, who had never been enamoured with the British type of low freeboard ships for general ocean service.

Deficiency of Freeboard.

Having given reasons why the repetition of the Victoria type should be deprecated, it is a satisfaction to be able to join in the tribute of admiration for the perfection of their construction. Undoubtedly the Victoria and the Sans Pareil are powerful engines of war. In the narrow waters of the Mediterranean, for which they will most probably be destined, the defects of the type in sea-keeping qualities will be less sensibly felt than in the heavy billows of the Atlantic.

Failure of the 110-ton gun of the Victoria.

The failure of the Victoria's 110-ton gun was the occasion for many contradictory statements in the Press. The failure has been the subject of a question in the House of Commons. Lord George Hamilton, replying to Mr. Gourley, said "the Victoria was to have been commissioned last summer, but was delayed by the long series of trials through which her second big gun was passed. This

gun in passing this ordeal showed some defects, which, although they did not render the gun unsafe or unserviceable, prevented it being accepted as a perfect gun, and it had been returned to the makers. A strengthened gun was supplied, and had taken the place of the rejected one. The Victoria would be sent to the Mediterranean with guns which had been satisfactorily tested in accordance with the Service regulations, and a proper examination of her guns had been carried out. The guns in the Victoria would remain appropriated to her. The armament in the various ships in the new programme was settled after exhaustive inquiry, and was fixed by Act of Parliament, and he had no intention of altering it, or of appointing a Commission to inquire into the conclusions then deliberately arrived at."

The defective gun has been returned to Messrs. Armstrong, in order that means may be taken to strengthen it in a satisfactory manner. To reduce the exceptional length, and to apply the weight saved by reduction of length to strengthen the gun in the chase, would seem a radical cure for its defects. The efficiency of the gun, or the power of the gun as recorded in comparative tables of ballistics, might be less after the alteration, but the result would probably be to give to the Navy a tolerably reliable weapon.

Nile and Trafalgar. Coming into office when Sir Edward Reed was making a formidable attack upon the design of the Admiral class, the present Board of Admiralty endeavoured, in the new type represented by the Trafalgar, to meet the objections which had been urged against the Admirals. It will not be necessary to reprint the description given of the Trafalgar and Nile in the last number of the *Naval Annual*. The leading features are shown in the plan (*Pl. 32*). The particulars of the designs are given in the subjoined table:

—		Trafalgar (as designed).
Length	feet	345
Breadth	„	73
Draught (mean)	„	27½
Displacement (approximate)	tons	12,000
Freeboard, forward and aft	feet	11¼
Heavy guns above water	„	15
Horse-power, forced draught		12,000
Speed, forced draught	knots	16½
Speed, natural draught	„	15
Coal carried	tons	900

—	Trafalgar (as designed).
Armament, main	4 67-ton B.L.
auxiliary	8 5in. B.L. 8 6-prs. 10 3-prs.
Length of belt . . . feet	230
Armour, belt . . . inches	20 to 14
turrets . . . „	18
citadel, redoubts, or barbettes . . . „	18
side between bases of barbettes or turrets . . „	16
armour tube, or base of barbettes . . . „	—
conning tower . . . „	14
auxiliary armament	Unprotected.

Both steam and gunnery trials of the Trafalgar have been highly satisfactory. In the steam trials with forced draught a speed of 17·20 knots per hour was attained, which is certainly exceptionally fast for a heavy turret ship of 12,000 tons displacement, 75 feet beam, and drawing 27 feet of water. The engines, by Messrs. Humphrys and Tennant, gave a mean collective horse-power of 12,818. At her full speed the Trafalgar raised, even in a calm sea and with little wind, an enormous bow wave. In a ship of low freeboard this bow wave would seriously interfere with the maintenance of a high speed in a seaway. Steam trials.

The gunnery trials of Her Majesty's ship Trafalgar took place on Saturday, 22nd February, 1890. The following description is from the *Times*:—"This ship was designed by Messrs. Barnes and Morgan, of the Constructive Department, under instructions from Admiral Hood, the First Sea Lord, at a time when the controversy which had long been waged against the alleged insufficient protection and armoured stability of the Admiral class had reached a crisis; and, though far from being a completely belted battle-ship, she was intended to embody the ideas of the naval officers and professional experts who clamoured for thicker armour and more extended protection against the shell-fire of quick-firing and other guns, and its supposed disastrous effects upon the buoyancy of the riddled ends. In other words, she may be described as an enlarged and improved Dreadnought, and differs from the Admirals not only in the increased depth and longitudinal area of her vertical armour, but in the fact that, as in the case of the Dreadnought, she carries Trafalgar gunnery trials.

her main armament of 4 13½-in. 67-ton guns mounted in pairs in a couple of turrets built along the middle line of the ship, instead of in barbettes similarly disposed. The change in the mounting of the guns, and the results of experience, have made it possible to introduce various modifications and improvements in the hydraulic loading gear, which is not only better placed, in consequence of the less confined spaces in which it works, but is simpler than in the Camperdown class, and much easier to handle and control. In the Admirals the loading from below of the ammunition cage with the two half charges of powder and the projectile is performed in the same compartment, and in consequence one operation has been frequently found to interfere with the other. The projectile is also rammed downhill into the cage at the loading angle of 12½ degrees, whereby great difficulty has occasionally been experienced in controlling it, or, in other words, preventing it from striking heavily against the stop which determines its position in the cage. In the Trafalgar, on the other hand, the shot is rammed uphill by a hydraulic rammer, while the charges are simultaneously forced downhill into the cage by hand from the opposite side.

Heavy guns fired in a fore-and-aft line.

"The ship got under way from the anchorage shortly after nine o'clock under satisfactory atmospheric conditions, and with just sufficient motion in the water to impart a lively roll to the ship as the engines were slowed down for firing. It has been frequently asserted that the 67-ton gun could not be fired in a fore-and-aft direction with out tearing up the deck and producing other mischief, and in previous trials the Admiralty were reluctant to subject a ship to the inexorable conditions of a naval engagement for merely experimental purposes. In the present case, however, the Director of Naval Construction insisted that the question should be set at rest, and it may be confidently said that no previous vessel was ever submitted to so severe and exacting an ordeal as the Trafalgar was on Saturday. For it must not be forgotten, that while in the Admirals the heavy guns are carried in barbettes, and consequently at a considerable distance above the deck, the turret mounting of the Trafalgar, while affording, it is contended, superior protection, brings the guns perilously near the plane of the deck, not more than 3 feet 9 inches intervening between their axis above the water when in a horizontal position and the height of the freeboard, or just sufficient to place the capstan, windlasses, and bitts below the line of the shot. The programme originally drawn up for the firing was arranged so as to begin each series of charges with a tentative round, delivered at 60

degrees before the beam, but to save time the preliminary rounds were dispensed with, and firing at close quarters was carried out in the following amended order:

FORE-TURRET.

Gun.	Charge.	Direction.	Elevation.	Recoil.
	lbs.			
Right . .	315	75 deg. before port beam	3 deg.	14½
Left . .	315	Ahead	1½ deg.	15½
Right . .	315	75 deg. before starboard beam .	Horizontal	13
Left . .	472½	Ahead	1½ deg.	29¼
Right . .	472½	82½ deg. before starboard beam .	½ deg.	29½
Left . .	630	Ahead	3 deg.	47¼
Right . .	630	67 deg. before starboard beam .	1 deg.	47¾
Left . .	630	Starboard beam.	13 deg.	52½
Right . .	630	Starboard beam.	13 deg.	49½
		AFTER-TURRET.		
Left . .	315	30 deg. abaft port beam . . .	Horizontal	14
Left . .	472½	10 deg. before port beam . . .	1 deg.	26¼
Left . .	472½	Port beam	7 deg.	28¾
Left . .	472½	5 deg. before port beam . . .	10 deg.	29¾
Left . .	472½	10 deg. before port beam . . .	13 deg.	32
Left . .	472½	20 deg. before port beam . . .	3 deg.	27
Left . .	630	10 deg. before port beam . . .	Horizontal	44¾
Right . .	472½	Starboard beam.	Horizontal	Unknown
Right . .	472½	Starboard beam.	3 deg.	Unknown
Right . .	472½	Starboard beam.	7 deg.	Unknown
Right . . } Left . . }	472½	Starboard beam.	10 deg.	Unknown

"The projectile used was a Palliser shell 40 in. long, and weighing 1250 lbs. It will be observed that the firing began with half-charges of slow-burning cocoa powder, and it need only be said that at the end of the first series not the slightest injury was recorded, the only incident being the whiffing to sea of some wooden chocks beneath the cathead. The first round with three-quarter charges blew off a butterfly-nut attached to one of the cable covers, while in the next round the blast got under the loosened plate and carried it away, besides detaching a whelp on the barrel of the capstan. So far everything had passed off satisfactorily. The series of full charges, instead of being, as was at first proposed, cautiously introduced with rounds discharged 60 deg. and 75 deg. before the starboard beam, was heroically begun with a round fired direct ahead with only 3 deg. of elevation. The immense rush of gas caused a depression of about 2 in. in the deck near the water ridge in front of the turret, bending a beam below and fracturing one of the stanchions on the forward mess deck. This was the only important injury suffered by the ship, and as none of the steel work

Results. Fore-turret.

permanently suffered, the result was an agreeable surprise for all concerned. The next shot shaved off a bit of the windlass bed as neatly as if performed by a workman's tool, and showed very plainly that the thick strake of planking requires to be bevelled at the edges. The two final rounds were intended to be fired simultaneously for the purpose of testing the hydraulic mountings, but owing to a misfire they were fired independently. The slow-burning powder produced a large volume of smoke.

After-turret.

"The firing from the after-turret was less important. The guns have a clear deck to fire over, and are not likely to be fought to the same extent in action as the forward pair. They were in no instance fired direct astern. The most interesting and valuable feature in the trial was some experiments in rapid firing in the seventh, eighth, ninth, and tenth rounds. It had been asserted in certain quarters that considerable delay attended the firing of the heavy ordnance with which our battle-ships are now armed, in consequence of the fouling of their chambers. Admiral of the Fleet Sir Thomas Symonds, in particular, took exception to the statement of the First Lord that the rate of discharge of the 110-ton gun was 3 min. 4 sec., and preferred to adopt the views of those who maintained that 'it would be dangerous, even if practicable, to fire such guns over four times an hour.' Hence the importance of Saturday's demonstration. From fire to fire the four rounds were delivered in 9 min. 7 sec.—namely, 3 min. 2 sec., 2 min. 58 sec., and 3 min. 7 sec., including the whole of the loading and training operations. Eight rounds could have been fired in the same time, both guns being fired together, and it is believed with a practised gun-crew the rate of discharge could be reduced to 2 min. each. The new non-return valve connected with the left gun was severely tested and answered all expectations.

Rate of discharge.

The auxiliary armament.

"Scarcely less important than the testing of the main armament was the trial of the guns composing the Trafalgar's secondary battery. As originally designed, she was to carry eight 5-in. breech-loaders on the upper deck between the turrets. The birth, however, of the 4·7-in. quick-firing gun at Elswick, and its singular range, rapidity of fire, and accuracy of aim under trial, induced the Admiralty to supersede the proposed armament by six guns of the new kind as being especially well adapted for protection against torpedo attacks as well as efficient for general warfare. Ten rounds were fired from each gun on the port side, the time taken varying from 1¼ min. to 1 min. 19 sec. for the ten. Ten rounds were also fired from the three guns on the starboard side at barrel-targets

while the ship was under steam. Though no actual hits were recorded, the practice was excellent. Time was only taken in one case, which was 1 min. 28 sec., as a slight jam occurred in one gun, retarding the firing; while in another the electric current got broken, and percussion tubes were resorted to. Four rounds were fired from each of the eight 6-pounder and the nine 3-pounder Hotchkiss quick-firers. It was intended to fire a full hopper from each of the four ·45-in. five-barrel Nordenfelts, but the machine-guns had not been fitted. At the end of a very successful series of trials the Trafalgar anchored in Portsmouth harbour."

New battle-ships. The Admiralty programme includes eight battle-ships of the first class and two second-class ships. The following description of the Royal Sovereign, one of the battle-ships, is reprinted from *The Times*.

"The length of the ship is 380 ft., and the extreme breadth 75 ft., draught of water 27½ ft., and displacement 14,150 tons. The flat pieces of keel are formed of steel plates three-quarters of an inch thick, while the vertical keel, which has a thickness of five-eighths of an inch, has a maximum height of 5 ft., the double bottom diminishing to 3 ft. 6 in. at the first longitudinal. Unlike the majority of similar structures, the vertical keel is perforated to allow the water to pass freely between the first water-tight longitudinals on either side. Above these is a second water-tight longitudinal, so that, as a matter of fact, the subdivision of the hull is greater than is usually the case.

Turret *versus* barbette. "The difficulty of deciding between the respective advantages attending the turret and barbette systems of mounting heavy ordnance is illustrated by the fact that, although the construction of the Trafalgar and Nile was the practical outcome of the popular revulsion against the Admiral type of battle-ship, and signified a return to the Dreadnought era of shipbuilding, three out of the four new ships to be built in the Royal Dockyards are to be barbettes, of which the Royal Sovereign is one. In the new armourclads, however, the distinction between the two systems is less marked in the structural arrangements than formerly, the turret and barbette designs being identical in every respect save the method of carrying the guns. And it is to be noticed that, while certain modifications have been introduced in the barbettes with a view more particularly of preventing the bursting of explosive shells beneath the gun-platforms, the assimilation has been almost entirely brought about by a readjustment of the turret system on the principle of the barbettes. Although the designs of the battle-ships were worked out by Mr. W. H. White, the Director of Naval

Construction, the new departure was initiated by the Board of Admiralty during their visitation of Devonport Dockyard last year, and ratified by their Lordships in November, after a conference with naval officers who had recently had experience upon different stations and in the manœuvres. The Board unanimously agreed, as was pointed out by Mr. White in his description of the new ships at the 1889 meeting of the Institution of Naval Architects, that the following principles should be complied with as regards the disposition of the armament of the projected battle-ships :—

Main armament.

"1. That there should be four heavy guns placed in two protected stations, situated at a considerable distance apart, each pair of guns having an arc of training of about 260 deg. equally divided on each side of the line of keel. All four of these guns to be available on each broadside.

Auxiliary armament.

"2. That the greater portion of the auxiliary (or secondary) armament should be placed in a long central battery situated between the two heavy gun-stations, and so disposed that there should be practically no interference with the fire of any one gun by that of any other.

"3. That in view of the development of high explosives, it was desirable to secure the widest possible distribution of the guns in the auxiliary armament; and that it was preferable to mount the auxiliary armament on two decks, one of them being the spar-deck, rather than to carry the guns chiefly between decks.

"The advantages attending the distribution of the heavy guns in a larger number of armoured enclosures (as in the Impérieuse and the Warspite, and in the majority of French battle-ships) were recognised; but it was thought that the concurrent disadvantages in relation to the greater weight of armour required for the protection of the single guns, and the interference of the fire of the heavy guns with the auxiliary armament, more than compensated for those advantages. It was also decided that the principle of concentrating the heavy guns amidships (as in the Inflexible, Edinburgh, and Ajax classes) in order to increase the thickness of the armour by diminishing the area of protection was not one which ought to be adopted, in view of the possible simultaneous disablement of the heavy guns and the interference of their fire with the effective fighting of the secondary armament. Eventually, the general features of the disposition of the guns in the Admirals were adopted.

Distribution of armour.

"Then, as to the distribution of armour, the question arose—Was it desirable to extend the belt to the stem and stern instead of having unarmoured ends? In the Admiral type the belt is carried over

150 ft. of the entire length of 330 ft., while in the Trafalgar type it is carried over 230 ft. of the total length of 345 ft. (involving in the one a sinkage of 15 in., and in the other a sinkage of 3½ in., with the forward end filled with water). Now, it is generally agreed that the protection to the water-line in the former case is too little, while there are many who maintain that perfect fighting efficiency and seaworthiness can only be achieved by adopting the French system of complete protection. The Board took a middle course, and decided that the length of the armour-belt in the region of the water-line in the new ships should bear the same ratio to the total length of the hull as in the Trafalgar. 'It was generally agreed,' it is said, 'that when the belt was carried over such a large portion of the length of the ship as in the designs under consideration, so that the spaces above the protective deck, before and abaft the belt, were of small capacity, and the entry of water to them would produce only small sinkage and very moderate change of trim, then it was preferable to dispose the weight available for water-line protection in the form of thicker armour on the belt not carried to the ends.' It remains to be said, however, that the stoppage of the belt at two-thirds of the length will necessitate the construction of armoured athwartship bulkheads as a protection against a raking fire, so that this additional weight will leave little available for the thickening of the armour amidships. Their Lordships also resolved that it was preferable to have two separate strongly-protected stations for the four heavy guns (about 50 ft. from the bow and stern respectively) rather than to have a single citadel; and that 4-in. armour amidships from the belt deck to the main deck, associated as it would be with the internal coal bunker, sub-divided into numerous compartments, might be considered satisfactory, but that if armour weight became available it could be profitably utilised in thickening the 4-in. steel above the middle portion of the belt. As a matter of fact, it was subsequently decided to make it 5 in. The abolition of the citadel is an important variation from previous turret-ship design, and one which tends materially to remove the radical difference hitherto existing between the principles of moving turrets and fixed towers. In the Trafalgar, for instance, the turrets are placed 120 ft. apart, and in order to protect their bases it is necessary to enclose them in a long citadel extending the full breadth of the ship, formed of 18-in. armour, with vertical armour on the sides rising to a height of about 11 ft. above water, and with a steel deck covering of the thickness of 3 in. In the new design the 3-in. steel deck is fitted at the top of the belt armour, while each of the turrets is placed in a separate lozenge-

Two separate redoubts.

Five-inch armour above belt.

shaped redoubt, 17 in. thick, and enclosing not merely the turret bases, but also the upper portion of the ammunition hoists and the loading appliances. Hence, to quote the Admiralty memorandum, 'the broadside of the ship in this case is protected from the top of the belt to a height of about 10 ft. above the water by vertical armour 5 in. thick, extending practically over the same length as the citadel extends in the other plan, and the ends of the space so protected are closed in by armoured screen-bulkheads extending to the height of the spar deck.' The turret-ship is to be built at Chatham on the recommendation of Admiral Sir Arthur Hood; but as the displacement, structure, and protection of all the four new battle-ships are nearly in all respects the same, it is difficult to perceive why an exception should be made, the more especially as the barbettes have the important advantage of carrying their guns 6 ft. higher above water than the turret-ship, and have a superior height of freeboard forward and aft, in the proportions of 18 ft. to 11¼ ft.

The turret-ship Hood.

"The Royal Sovereign will far exceed in weight any ship hitherto built for the Navy, while in length she will equal the Achilles, Black Prince, and Warrior, the representatives of the early era of armourclads. She is also to surpass all existing competitors in speed and auxiliary armament. At the water-line she will be protected by a belt, 8½ ft. broad, extending over two-thirds of her length, and having a maximum thickness of 18-in. armour. The belt is terminated by transverse armoured bulkheads; above it is a 3-in. steel deck, while a strong under-water deck completes the protection before and abaft the belt. The broadside above the belt is protected, to a height of 9½ ft. above water over a considerable portion of the length, by 5-in. armour, screen bulkheads, similarly armoured, enclosing the central battery. The armour on the barbettes will be 17 in. thick, while the protection of the guns and their crews in the auxiliary armament, as well as the ammunition supply in all the stages of its passage from the magazines, has been carefully arranged in view of the development of high explosives and quick-firing guns. The result of the experiments against the Resistance has also had the effect of introducing an obvious improvement upon previous barbette ships. In the Admiral class the barbettes are carried at a considerable height above the armoured portion of the hull, the conveyance of the ammunition to the guns being protected by armoured tubes; but in the new ships it was decided not only to extend the protection at the water-line, but to continue the armoured towers down to the top of the belt in order to preclude the possibility of the bursting of shells containing large explosive charges under the floors of the

Armour belt.

Barbette armour.

barbettes upon which the revolving gun platforms are carried. Considering the progress which has taken place in gun manufacture, more particularly in respect of the development of quick-firers, changes of armament may become imperative as the ship is advanced towards completion. There was a considerable weight of opinion among the naval officers called in for consultation that a 12-in. gun of modern design and of about 50 tons in weight might be made, which would possess sufficient power for most purposes; but as no such gun was in existence, while the 67-ton gun was thoroughly successful, and all the details of the ammunition and mountings had been settled, it was generally agreed that guns of this nature were to be preferred for the main armament. As at present arranged, therefore, the guns of the Royal Sovereign will consist of the following miscellaneous assortment:—Four 13½-in. 67-ton guns (carried 23 ft. above the water), ten 6-in. 5-ton 100-pounder quick-firers, sixteen 16-pounder and eight 3-pounder quick-firers, together with seven torpedo-tubes, of which two will be submerged. **Armament.**

"The propelling engines will be of the maximum power of 13,000 horses under forced draught, and of 9000 with natural draught, and the committee came to the conclusion that speeds of 16 knots with open stokeholds and 17½ knots with closed stokeholds were sufficient in view of the considerable increase in size and cost involved in obtaining higher speeds; and that it was preferable with a given expenditure to have a larger number of vessels possessing these speeds rather than one or two vessels of superior steaming power. Thanks in part to her greater length (35 ft.), the Royal Sovereign will be a knot quicker than the Trafalgar. The coal carried will amount to 900 tons, which will enable the ship to steam a radius of 5000 knots at a speed of 10 knots, and from 1800 to 2000 knots at her maximum speed. The laying down of the keel was deferred to the present time owing to the necessity of docking the Minotaur in No. 13 dock. In the meantime a large amount of prepared material has been accumulated, and the work of construction will be rapidly advanced. According to programme, she is to be completed in December, 1893." **Propelling machinery.** **Radius of action.**

The design for the new battle-ship was, as has been stated, ably described in a paper read by Mr. White at the Institute of Naval Architects in the session of 1889. In the discussion which followed, several of the most distinguished officers of the Navy took part. The naval men were unanimous in passing a verdict of approval. Lord Armstrong gave as strong a commendation as was consistent with the position he has steadily maintained as a convinced open opponent

of the policy of constructing ships of so great cost and of such vast dimensions; he expressed his belief that a judicious compromise had been made between defence on the one hand and offence on the other.

In an article suggested by the discussions which had recently taken place, the *Engineer* calls attention to an important point of superiority in the latest British type over the latest ships constructed for the French Navy:

"It is the fashion in our Navy to admire the Amiral Duperré, chiefly on account of her height and complete belt, we believe. We hope that these ships will meet with approval, as being a rather nearer approach to the French type than our previous designs. We venture to think these vessels greatly superior to the French, seeing that in the latter the men working the heavy guns have their heads and shoulders entirely exposed to mitrailleuse fire; while the broadside batteries, which have no armour, are regular shell traps for quick-firing gun projectiles and for shrapnel, so that it may be questioned whether the whole of the Duperré's guns might not be silenced by the fire of these insignificant pieces."

Second-class ships. The two second-class battle-ships have been named the Barfleur and the Centurion. One is to be built at Chatham, and the other at Portsmouth. The ships are to displace 9000 tons, the engines are to indicate 10,000 horse power.

Armoured cruisers.

Northampton. The Northampton was the earliest specimen of armoured cruisers in the great muster at Spithead. Her capacious bunkers give so large a supply of coal that the obsolete character of the engines is not felt as a serious defect in respect to the capability of keeping at sea. The want of speed is a more serious defect. The form of the ship is most unfavourable for fast steaming. It is a question whether it would be worth while to give these ships finer bows, or to lengthen them amidships.

Impérieuse and Warspite. We have done much better in our later ships. The Impérieuse and the Warspite were protected ships of a novel type, laid down under the administration of Lord Northbrook. The design sustained a heavy fire of criticism from Sir Edward Reed. Happily his adverse opinion has not been borne out by the general verdict of the Navy after experience of the excellent qualities of these ships for sea service. In the last number of the *Naval Annual* a suggestion was made for an improved distribution of armour, the hope being expressed that more ships possessing the leading characteristics of the Warspite in the essential particulars of the design of the hulls, the speed and

coal endurance would be laid down. The Impérieuse is at present in commission on the China station. Reports of her excellent performances as a cruiser have been given from time to time in the columns of the *Army and Navy Gazette.* On a late occasion the ship made the run from Hakodate to Yokohama, 510 miles, in 36 hours, attaining during the last hour of the run a speed of 16·5 knots an hour. The engines worked without stoppage throughout the trial. The Warspite is now commissioned as the Admiral's ship on the Pacific station.

Belted cruisers.

We pass on to the belted cruisers. We have built seven ships of this type; six of them formed a noble group in the fleet assembled at Spithead to receive the German Emperor. The first of these ships were laid down as part of the Northbrook programme. The belted cruisers were designed to have the speed and coal endurance necessary to give effective protection to British shipping against the attacks of fast commerce destroyers. They were to be so armed as to be capable of meeting on even terms any second-class battle-ships which might be found in distant waters. The belted cruisers very fairly fulfil the exacting conditions laid down. They have a measured-mile speed of 18 to 19 knots, and a coal endurance of 8000 knots. They are well armed both with light and heavy guns. Their machinery is protected by a 10-in. belt. It has been objected that the belt is too short, and in the wrong place. The answer of the Admiralty was given to the House of Commons' Committee on the Navy Estimates. Want of protection for the men crowded together at the guns is the weakness of the belted cruisers. They share this defect with much more costly battle-ships under foreign flags. During the manœuvres the belted cruisers aquitted themselves well, both as to speed, and ability to fight their guns in all weathers. On a late occasion the Orlando, one of this class, steamed from Lyttleton to Wellington, a distance of 170 miles, in less than ten hours, and without the use of forced draught.

Compiler's criticism.

The criticism which the compiler would pass upon the belted cruisers is one which seems to apply equally to all recent designs. The ships are over-packed with guns; there is no clear space upon their decks. Regarding these ships not as battle-ships, but as protected cruisers, their complements are too numerous for the work they have to do. They carry more men than it is proper to crowd together in ships as vulnerable as they are. Given the problem of carrying to sea the number of guns now mounted in the seven ships of the Orlando class, it would have been better, though doubtless much more costly, to have distributed the guns into nine

ships, rather than to have crowded them together unduly, as we have done in the seven vessels.

Protected cruisers.

Passing from the armoured to the protected types, the new great cruiser, the Blake, launched at Chatham by Lady George Hamilton in November last, was a notable addition to our fleet of cruisers. The following description is taken from *Engineering*:—

Blake and Blenheim.

"The Blake is the first of the pair of protected cruisers which were announced in the programme of ship construction put before the House of Commons by the First Lord of the Admiralty in 1888.

"These vessels—the sister ship is the Blenheim, now under construction at the Thames Iron Works—have been designed by Mr. W. H. White, the Director of Naval Construction and Assistant Controller. (See Illustration, and also *Pl. 8* of Part II.)

"The following are the chief elements as set forth in the official publications:

Length	375 feet
Breadth	65 „
Displacement (about)	9000 tons
Speed (with full coal supply) on measured mile	22 knots
Speed at sea (continuous steaming)	20 „
Radius of action:	
At 10 knots about	15,000 „
„ 20 „	3,000 „

Compared with ironclads.

"Our first ironclad, the Warrior, was 380 ft. long and 58 ft. wide. The Minotaur, Northumberland, and Agincourt, which followed the Warrior, were 400 ft. long and 59 ft. wide, and 10,600 tons displacement. The five masts, three having yards, with which these vessels were originally fitted, gave them a most imposing appearance, such as we look for in vain in our modern battle-ships, with their single military mast and top, standing up in them like a stunted flag-pole stuck through a band-box lid. The Northumberland class were the longest battle-ships we have built, for in the Fury design (now Dreadnought) the length was reduced to 320 ft., with 63-ft. 10-in. beam, a length which was retained in the Inflexible, although in the latter vessel the beam was increased to 75 ft. In the Nile and Trafalgar we have gone up again in length to 345 ft., with 73-ft. beam, whilst the new first-class battle-ships of this year's programme are to be, as already stated, 380 ft. long and 75 feet wide, the displacement being 14,150 tons.

Compared with cruisers.

"These, however, are battle-ships, but if we turn to cruisers we find the Blake to exceed all vessels of the same type which have preceded her. The ships of Orlando class were 300 ft. long and 56 ft. wide, the displacement being 5600 tons. It is only the

Impérieuse and Warspite amongst the armoured cruisers that at all approach the Blake and Blenheim in dimensions. These vessels are 315 ft. long and 62 ft. wide, and have a displacement of 8400 tons. All these ships, however, differ from the Blake in the notable particular that they have more or less side armour, whilst the latter vessel has no plating designed solely for protection other than that worked into her deck. If we turn to the list of previous vessels which come into the same category, we find the Mersey and her sisters 300 ft. long and 46 ft. wide, with 4300 tons displacement. The Shah and Inconstant, unprotected cruisers, alone exceed these in dimensions, the latter having a length of 337 ft. a width of 50 ft. 3 in., and a displacement of 5780 tons, whilst the Shah is 3 ft. shorter, 1 ft. 9 in. wider, and 6250 tons displacement.

French cruisers.

"Turning to the French Navy, we find amongst the unarmoured ships the Alger, now in course of construction, which is described as a frigate-built cruiser. She is 346 ft. long by 45-ft. 3-in. beam, and is 4160 tons displacement. The Cecille, launched in 1888, is 378 ft. 9 in. long and 49 ft. 3 in. wide. Her displacement is 5766 tons. The Tage, also a deck-protected frigate-built cruiser, is 390 ft. long, 53 ft. 8 in. wide, and of 7045 tons displacement. These three vessels are all put down as having a speed of 19 knots.

Piemonte.

"The most noticeable cruiser the Italians have is the Elswick-built Piemonte, deck-protected. She is more celebrated perhaps for her armament which consists of quick-firing guns.

Armament of Blake.

"The armament of the Blake consists of:

"Two 9·2-in. (22-ton) bow and stern chasers.

"Ten 6-in. (5-ton) quick-firers, broadside.

"Eighteen 3-pounder quick-firers.

"Four torpedo-tubes.

"So far as the number of weapons is concerned, we believe no departure has been made from this programme, but the 9·2-in. guns are to be of somewhat heavier weight. It is also promised that the supply of ammunition to the quick-firing guns will be in excess of that carried by any other cruiser, a fairly safe statement considering the size of the vessel.

Protective deck.

"The protective steel deck extends throughout the length of the ship. It will be 6 in. on the slope and 3 in. on the horizontal part. The 6-in. deck will, it is calculated, afford a protection equal to 12 in. of vertical plate; but the conditions in this respect will naturally vary with the angle at which the projectile strikes, according to the roll of the ship. The top of the deck rises to a maximum of about 18 in. above the water-level, but at the sides it curves down until

where it joins the plating of the skin it will be 6½ ft. below water. There is no vertical side armour.

Propelling machinery.

"The propelling machinery is to be supplied by Maudslay's, the guaranteed indicated horse-power being 13,000 for twelve hours' steaming at natural draught, and 20,000 indicated horse-power for four hours' with forced draught. The condition of steaming for long periods and over great distances at a high speed was a leading feature which Mr. White kept in view in getting out the design. The great length of the vessel—that is great for a warship—has been a necessary condition to secure this advantage. The counter-balancing objection one would naturally look for, is a loss of that quickness of turning, a dread of which has always tended so much to keep our war-ships short. The possible conditions under which the Blake would have to act in war have been most carefully weighed and considered, and perhaps in few instances will Mr. White have brought his well-known mastery of his profession more strongly to bear than in reconciling in this ship the antagonistic qualities of speed at sea and manœuvring qualities.

"The speed estimated to be obtained is 20 knots for natural draught and 22 knots for forced draught.

"The total estimated cost of the ship is put down at £423,182, with £24,012 additional for guns. Of this £123,910 is approximately for labour in the dockyard and £89,740 for materials. The contract work is £153,652. The estimated proportion of incidental charges is £38,439. The propelling machinery is to cost £133,992."

Vulcan.

In June, 1889, the Vulcan was launched at Portsmouth. She is intended to accompany a fleet to sea to carry a large equipment of torpedo-boats, mining and counter-mining stores, and to form a floating workshop. The following description is from the *Broad Arrow*:—

"The Vulcan's length is 350 ft., and beam 58 ft.; so it will be seen that, for a fast vessel, she carries considerable beam in proportion to her length. The old Iris and Mercury are 300 ft. by 46 ft., and the Severn class and the Arethusa class are of the same dimensions. Thus it will be seen that most of our cruisers designed prior to the retirement of Sir Nathaniel Barnaby from the post of Director of Naval Construction were six-and-a-half times their beam. The Medea class, which most naval men pronounce to be failures, as they are too short and too low waisted, and have too many excrescences in the way of sponsons, to steam at any speed against a head sea, preserve the same proportions between length and beam; but the Barham, a smart-looking little craft now building on the next slip to

the Vulcan at Portsmouth, is to be eight times her beam, or 280 ft. by 35 ft.; the Barrosa, on the other hand, is not quite six-and-a-half times her beam, while the Rattlesnake class are nearly nine times their beam, being 200 ft. by 23 ft., and the old Hecla, which was built for a merchant steamer, is over ten times her beam in length, as are most of the fast Atlantic mail steamers. The French cruisers of the Barham class—the Coetlogon, Cosmao, Forbin, Lalande and Tronde—are ten times their beam in length, while the Vulcan's length is only six times her beam. This is no doubt wise; a torpedo depôt-ship requires beam to give her space to stow her torpedo boats, and also to give a steady platform at sea for carrying her frail cargo, and for enabling work to go on satisfactorily in the workshops. The Vulcan's length of 350 ft. is a very good one for cruisers. The Iris and Mercury have always been reported by their captains to be too short; as they are very sharp forward, when forced against a head sea they bury themselves too much. The Vulcan has beautiful lines, and the only fault we find with her shape is that she carries her ram too low. She is designed to carry it at least ten feet under water, or quite as low as the first-class battle-ship Trafalgar carries hers. Had the Vulcan's ram been cut away from about four or five feet under water, it would have made the ship much more buoyant forward, and a ram at that depth would have been all she will require for running down torpedo boats, or ramming an unarmoured ship. The Vulcan's displacement, when down to her load draught of 22 ft., will be 6620 tons, and it is estimated that her engines, which are to indicate 12,000 horse-power, will give a speed at forced draught of 20 knots. She is to carry eight 36-pounder quick-firing guns and twelve 3-pounders. Her keel was laid on 18th June, 1888, hardly twelve months ago."

Previous to the laying down of the Vulcan, the Hecla was the solitary representative in the British Fleet of a most essential element in the fighting efficiency of a squadron of modern ships.

First-class protected cruisers.

The Admiralty are going forward on the line of construction in which the Blake and the Blenheim were the pioneers by laying down nine new first-class protected cruisers of the Edgar type. Four out of the nine—Edgar, Centaur, Crescent, and Hawke—are building in the Royal dockyards; the Endymion, Gibraltar, Grafton, St. George, and Theseus, are being constructed on the Thames, Clyde, Tyne, and Humber.

The following description is from the *Times*:—

Edgar class.

"The first-class protected cruisers, officially described as of the Edgar type, are enlarged Merseys and diminished copies of the Blake

(see *Pl. 15* of Part II.). They are of 7350 tons displacement, 360 ft. long, 60 ft. beam, and draw 23 ft. 9 in. of water. Their engines are to indicate 12,000 horse-power with forced draught and 7500 horse-power with natural draught, which it is expected will give them sea-going speeds of 20 knots and 18 knots respectively; but if two knots be subtracted from each of these theoretical speeds, and the ships are able to accomplish even that much on actual service, we may consider ourselves well off. The supply of coal will be sufficient to steam 10,000 knots at 10 knots an hour, or 2800 at 18 knots.

Armament.

The armament will consist of two 9-in. 22-ton guns, ten 6-in. 5-ton breech-loading guns, twelve 6-pounder quick-firers, and four torpedo tubes. It is of doubtful advantage to introduce the 22-ton gun into the armament of a protected cruiser. A cruiser should in no circumstances engage an armoured battle-ship. On the other hand, against unarmoured and unprotected vessels the penetrating power of the 6-in. guns is more than sufficient. They are capable of piercing a 10-in. armour plate at 500 yards. They have the important merit of being easily worked by hand without the aid of machinery. It would have been wiser to have been content with an armament limited to the useful 6-in. gun—to have kept the dimensions of our first-class cruisers within the limits required to carry the lighter armament combined with the speed and the coal endurance which have been given to the new cruisers, and while thus reducing the tonnage of the individual ships to have built a greater number.

"To complete the description, it only remains to mention that the protective deck extends throughout the length of the ship, the thickness varying from five inches to one inch of steel. The guns' crews will be protected by shields, and the ammunition will be protected in its passage from the magazines to the guns."

Arethusa and Mersey class.

At the inspection at Spithead last year, the fast cruisers, which are becoming a prominent, as undoubtedly they are a most valuable feature in our programme of shipbuilding, were all represented. The Iris, the Mercury, and the Arethusa, one of four ships of the same type laid down under Lord Northbrook's administration, and three representatives of the later Mersey class, formed part of the assembled fleet. We may congratulate ourselves on the recent addition to the Navy of the ships of the Arethusa and the Mersey types. The former have a measured-mile speed of 16 knots. Their coal endurance is 11,000 knots at 10 knots. The four cruisers of the Mersey class have reached 18 knots at the measured mile. Their coal endurance is 8750 knots. In the relative proportion of beam to length—46 feet

to 300 feet—they present a marked contrast to the fastest vessels of the mercantile marine. With experienced crews the Merseys and the Arethusas do well.

Having to record many break-downs during the manœuvres, it is a pleasing duty to refer to the satisfactory performances of the Phaeton, now in commission in the Mediterranean. Between the months of May and November last she steamed nearly 11,000 miles at speeds varying from 12 to 17 knots. In the early days of her commission the ship had an unenviable notoriety for failures in the engine-room. With more experience of actual working, the machinery has left nothing to be desired. While glad to be able to claim a small share in the responsibility and the credit of adding such ships as the Merseys and the Phaetons to the Navy, it is a duty carefully to consider what modifications are shown by experience to be desirable in future types designed for similar duties. **Phaeton's performance.**

Following the steadily-maintained traditions of the British Navy, the power to carry an armament formidable in proportion to the tonnage was considered desirable in these recent additions to our fleet of cruisers. We may compare the armament of our British ships with that of their French contemporaries. The Merseys have a displacement of 4050 tons. The cruisers nearest in dimensions now building in France are the Alger, the Isly, and the Jean Bart. On a displacement of 4160 tons, the French cruisers carry four 5-ton and six 3-ton guns, giving a total weight of 38 tons. The Merseys carry two 15-ton breech-loaders and ten 6-inch 5-ton breech-loaders. The aggregate weight of the guns is 80 tons. In addition to the main armament our ships bristle with machine and quick-firing guns. The French naval authorities are less exacting in their requirements as to armament, and their constructors are able to adopt forms more favourable to speed, especially to speed in a sea-way, than we find in the British cruisers. The Isly and her consorts have a length of 346 feet, as against the 300 feet of the Mercury, Arethusa, and Mersey. The French beam is 43·6 feet, to the 46 feet of the British ships. In the French ships the coefficient of fineness is more developed than in the British ships. It is not possible to combine the British armament with the French speed within the limits of tonnage of a second-class cruiser. While accepting without question the decision of our Admiralty to give heavy armaments to the Arethusas and Merseys, it is certain that speeds largely in excess of those reached in our second-class cruisers are necessary for the service of a fleet. Higher speeds can only be reached by reducing the weight of armaments and adopting forms such as we find in the French **Comparative weight of armaments of British and French cruisers.** **Compiler's opinion.**

M 2

Navy. Deficiency of length is a fault common to all save the most recent ships of the cruiser class in the British Navy.

Medea class.

The ships of the "M," or Medea, class are five in number: the Melpomene, the Marathon, the Magicienne, the Medea, and the Medusa (see *Pl. 22* of Part II.). Within the limits of a displacement of 2800 to 2950 tons it was intended to combine high speed, good coal endurance, and a powerful development of the quick-firing armament. The symmetrical appearance of these ships on the water was highly commended by M. Weyl in his description of the inspection at Spithead. Everything which ingenuity could accomplish within the allotted dimensions has been combined in the ships of the Medea class. More has been attempted than it is practicable to give in speed and fighting power in ships of less than 3000 tons. The following is from the *Broad Arrow*:—

Opinion of *Broad Arrow*.

"The second-class cruiser Medusa, 2800 tons and 9000 horse power, went out for her forced draught trial in the Solent on Wednesday. The five vessels of this class, which were designed by Mr. W. H. White as 19·75 and 20-knot cruisers, have now all been tried, with the result that they average about 19 knots on the measured mile with forced draught. The Magicienne and Marathon get very little more speed with forced than with natural draught. The ships are too cramped, as most naval men foretold when their keels were laid; and the improved Medeas are to be 300 ft. by 43 ft., instead of 265 ft. by 41 ft., which are the dimensions of the five vessels of the Medea class. The latter ships have boilers too small for their large engines, and the stokers have not sufficient room to stoke; consequently it is difficult to maintain steam. Their freeboard is too low, and they are particularly low-waisted, while the gun sponsons are very low, and the electric light sponsons seem to be designed with the express purpose of throwing water up on the after-bridge and poop; the fore-part of the Medusa's electric light sponsons has been filled in with wood, to counteract this defect to a certain extent. These sponsons should be raised 6 feet. These ships also have too much weight at their extremities. In addition to the guns on the poop and top-gallant forecastle, the bower anchors are stowed very far forward, with a small anchor just abaft them. The result of all these defects is that the ships are very wet, and their ocean full-speed would not be more than 16 knots."

In his able paper read at the recent meeting of the Institution of Naval Architects, Mr. White deals fully and successfully with many criticisms which have been passed on the Medea class.

On the point of speed Mr. White remarks that the first trials of

the Medea were made under disadvantageous conditions, the bottom of the ship being in a rough and dirty state. On the measured mile, with the ships properly prepared for trial, their performance showed results as under:—

—	Indicated Horse Power.	Speed. Smooth Water, Clean Bottom.
Progressive trials—		
Forced draught	10,000	19·9 knots
Natural draught	6,300	18 knots
Continuous steaming (estimated)	3,500	$15\frac{3}{4}$ knots

"The class of ship (generally known as the Medea class, probably because it is the last completed), has been made the subject of considerable criticism, more especially on the ground that the intended speed has not been realised. As the designer of the vessels, I may be permitted to state that the intentions of the design have been realised in all respects; not merely as regards speed, but also draught, trim, stability, and structural strength. The criticism arises from a misunderstanding of facts. Prominence having been given to the forced-draught, smooth-water measured-mile trial speed of 20 knots, it has been treated as if it were the sea speed, but without any official authority. As a matter of fact, before the manœuvres began a statement was issued to the fleet in which the speed of the Medea class for continuous steaming was estimated at from $15\frac{1}{2}$ to $15\frac{3}{4}$ knots, and experience justifies this estimate. No doubt this speed could be exceeded for short periods, just as in the chase in the North Sea the Anson and Howe steamed for six hours and developed as much power over that period as had been developed on their contractors' natural-draught trials. Further experience with all these new ships will doubtless give better results."

In a later portion of his paper Mr. White deals with some other points.

Defects of the Medea class.

"There have been allegations, for instance, of structural weakness in some of the ships engaged in the manœuvres. For these allegations there is no foundation whatever in any of the reports received. All the vessels of the class have proved to be amply strong, and almost entirely free from vibration, even when developing the full forced-draught power. There were a few instances where minor defects of workmanship caused leakage and discomfort in some of the ships—

not the Medeas. None of these, however, indicated structural weakness. Experience in these manœuvres has led to alterations, or rather to additions, in certain classes of ships, which may be grouped under three heads. (*a*) Additional ventilation has been found desirable especially to engine and boiler-rooms placed under protective decks, and it is being supplied; (*b*) greater facilities for intercommunication between engine-rooms and boilers at a low level in the ships have been proved to be absolutely necessary for safety and good working, and are being provided. Similar experience has, I know, been gained in some high-powered merchant steamers; (*c*) improved arrangements for the transport of coal from the upper bunkers to the fire in ships with protective decks have been shown to be desirable by the hard, continuous steaming done during the manœuvres. This matter had been very carefully studied in all recent designs, and it was clearly undesirable to pierce protective decks more than was absolutely necessary. All the original arrangements stand good; the additions consist of three or four additional scuttles on each side placed within the bunkers and fitted with armour covers. I venture to state the facts, as it would appear from some published statements that, instead of the simple addition, we had been engaged in some reconstruction of the vessels."

Compiler's opinion.

Having heard Mr. White, than whom the country never had an abler or more faithful public servant in the important appointment which he fills so well, the present writer remains of opinion that in the ships under consideration too much has been attempted within the limits of tonnage. To secure the steaming qualities and the fighting power required in the Medea class, the constructors should have been allowed to go to a displacement not inferior to the 3730 tons of the Mercury and Iris. With an addition of 50 feet to the length, the same speed would probably have been attained in smooth water. In a sea-way the falling-off would have been much less.

It is when driving at a head sea that the inferiority of the short ship is most conspicuous. It would be a great advantage incidental to an increase of length that a considerably increased space would be gained for engines and boilers and for the convenient stowage of coal.

Cramped engine-rooms.

The engine-rooms of the Medea class are crammed with machinery to a degree which must be detrimental to efficiency. When working at high speed the physical sufferings of the engine-room complement are such that they could not be endured in a continuous run. The trouble experienced in taking coal from the bunkers to the furnaces in the "M," or Medea, class has brought the engineers into conflict with the constructors, the latter insisting on the necessity of having

an almost unpierced protected deck, covering engines, boilers, bunkers and magazines, and a series of watertight bulkheads minutely subdividing the ship into watertight compartments. The engineers contend that it is impossible in practice either to feed the fires with sufficient rapidity to enable the ship to maintain her proper speed, or even to work her with due regard for safety, when all the watertight doors are closed. The engineers want fewer bulkheads and more openings cut in the protected deck.

Larger boiler capacity necessary.

The numerous breakdowns during the manœuvres in the boilers of modern ships have shown that too much reliance has been placed on forced draught as a means of obtaining additional power; the boilers have been too light, the boiler capacity and grate area have been insufficient. It has already been decided that boilers of a given power should be increased by 20 per. cent in weight. More boilers are necessary—in other words, to get speeds of 20 knots an hour in our cruisers we must increase the length of the ship. With lighter armaments, and engines of sufficient indicated power to give a speed of 17 knots, the "M" class would have been an entirely successful type.

Second-class cruisers.

The second-class cruisers form numerically a considerable, though hardly a sufficiently important, feature in the new programme of ship-building on which the Board of Admiralty are engaged. The *Times* gives the following particulars:—

Apollo class.

"The twenty-nine second-class protected cruisers, known at Whitehall as the Apollo type, have a displacement of 3400 tons, a length of 300 ft., breadth 43 ft., draught 16 ft. 6 in. (see *Pl. 3* of Part II.). They are to be of 9000 horse-power, and are intended to steam with natural draught at a speed of 18 knots. They are to be armed with two 6-in., six 4·7-in., and nine quick-firing guns. Many persons are of opinion that these ships are too short and too small for the work they are expected to do, and it is therefore to be hoped that such a large number as twenty-nine of them will not be taken in hand before one has been tried at sea. Push the completion of one of them forward with all despatch, spare no money or labour to get her ready as quickly as possible, but do not let us fall into the same error as has occurred with the Sharpshooter class, on which the waste of public money has been great. Before ordering a whole batch of vessels of one pattern, common-sense and the ordinary instincts of a business man require us to be satisfied that the pattern is a good one and deserves to be multiplied. In the case of the Sharpshooter class no such precaution was taken, and the result does not encourage a repetition of the procedure adopted in the building of those vessels."

The cruisers of the Australian squadron.

In addition to the second-class cruisers in hand for the British Navy, five vessels of the Pandora class are in progress for the Australian Squadron. The following description is from *Engineering* of October 25th, 1889.

"The cruisers and gunboats for the Australian Squadron are now in an advanced stage of construction: one or two of them, indeed, are launched, and the others will be in the water in the course of a few weeks, so that within four or five months the vessels will be in the hands of the Admiralty authorities.

Arrangements with the Australian Government.

"About three years ago negotiations were entered into between the Admiralty and representatives of the Australian Colonies to secure such an arrangement as would give the colonial people a greater security or protection in times of war. The main principle is that five cruisers (improved Archers they were called), and two torpedo gunboats, of the Rattlesnake type, built and equipped by the Imperial Government, are to be sent to Australia. The three cruisers and the two gunboats are to be immediately commissioned, while the others are to be held in reserve in Australian ports for commission when occasion arises. The Colonies are to pay interest on the first cost at 5 per cent., the maximum sum being 35,000*l.*, and for maintenance, crews, pensions, &c., a maximum of 91,000*l.*; while, when the two vessels are needed in times of war, the cost of manning, &c., will be defrayed by the Imperial Government. The Home Government will not reduce the present force in Australian waters. The new squadron will be under the control of the Naval Commander-in-Chief of Her Majesty's fleet in Australia. The agreement lasts for ten years, and only terminates then if notice has been given two years previously. In any case two years' notice is necessary. On the termination of the agreement the vessels remain the property of the Imperial Government.

Pandora class.

"The five cruisers are named Pandora, Pelorus, Persian, Phœnix, and Psyche; the former three are building in the Elswick establishment of Messrs. Armstrong, Mitchell, and Co., and the latter two in the Clydebank Works of Messrs. James and George Thomson, who construct the engines for their vessels, while the machinery of the other three is in the hands of Messrs. Hawthorn, Leslie, and Co., Newcastle-on-Tyne.

"The new vessels will have a greater speed by two knots than the Archers. They will have a strong protective deck, whereas the Archers depended for protection on the arrangement of the coal bunkers and minute subdivision. In armament, too, they will have the advantage of recent inventions, and as a whole it will be 10 per

cent. heavier in weight, while the radius of action will be about 30 per cent. greater. The internal arrangement and protection of the new vessels is similar to that in the Medea class. The Australian cruisers are to steam at 19 knots on 7500 indicated horse-power, while the Medea's speed was 19·8 knots on 10,000 indicated horse-power.

"The protective deck is of steel, 1 in. thick on the level part, thickening to 2 in. on the slopes. The conning tower is of 3-in. steel. Each vessel has a double bottom on the cellular principle, for carrying 400 tons water ballast. Internally the vessels are divided into thirty main watertight compartments, two of the compartments being occupied by the twin engines, and two others by the boilers. The other main compartments are minutely subdivided, particularly above the protective deck. Above and below this deck bunkers are arranged for 300 tons of coal, which will give the cruisers a radius of action of 6000 knots at 10 knots speed, and of 1300 knots at full speed. Under the poop aft accommodation is provided for the officers, while the seamen are housed forward under the forecastle. In each vessel a crew of 190 men has been provided for.

Armament.

"The armament consists of eight 4·7-in. quick-firing guns on central pivot mountings, from the Elswick establishment. Two of these will be placed on the forecastle, two on the poop, and two each on the port and starboard sides on the upper deck. Each of these guns weighs 2 tons 1 cwt., and has a length of 40 calibres. Fired with a charge of 10½ lb. of Chilworth powder, with an initial speed of 2250 ft. per second, a shot weighing 45 lb. may be thrown with sufficient velocity to penetrate at close range rather more than 10½ in. of wrought iron. This gun may be discharged about ten times per minute. In addition to these, there will be eight 3-pounder quick-firing guns and several machine guns. There will also be four torpedo-tubes, one on each broadside, one forward, and another aft.

Propelling machinery.

"The propelling machinery consists of twin-screw triple-expansion engines of the vertical type, capable of developing 7500 indicated horse-power under forced draught and 4500 indicated horse-power under natural draught. The Archers developed 4000 indicated horse-power. The diameter of the high-pressure cylinder is 30½ in., intermediate 45 in., and low-pressure 68 in., the length of stroke being 33 in. The engines run at a very high speed, and are very compactly arranged with the view of economising the room, which is limited owing to the protective deck. Steam at a working pressure of 150 lb. to the square inch is to be supplied from four double-ended boilers, each 11 ft. 6 in. in diameter and 17 ft. long, having in all

sixteen furnaces, with a grate surface of 375 square feet, and a heating surface of 9400 square feet. With the engines under forced draught, and indicating 7500 horse-power, the speed on a four hours' trial is to be 19 knots per hour; the natural draught trials are to extend to twelve hours, and with 4500 indicated horse-power the speed maintained is to be 17½ knots.

Rig.

"The vessels will have two masts, with only fore and aft steadying sails, and they will not have military tops, these having evidently been discarded by the Admiralty in vessels of this class. They will have the usual balanced rudder, and the steering gear, like all the other 'vitals,' will be below the protective deck.

"The cruisers are said to be improved Archers, but they might be more fitly described as of the Medea class. In giving their dimensions it may be interesting to place side by side the figures relative to the Medea and Archer.

	Pandora. Feet.	Medea. Feet.	Archer. Feet.	Inches.
Length between perpendiculars . . .	265	265	225	3
Breadth (extreme)	41	41	36	0
Draught	15¼	16	14	6
Displacement, tons	2580	2800	1630	0."

Compiler's opinion.

In a former number of the *Annual* the compiler expressed the opinion that vessels of a larger tonnage than the Pandoras would have been more suitable for the Australian station. On the east coast of Australia the vessels now building will do very well. In the heavy billows frequently encountered off Cape Leeuwin and on the southern side of Australia, ships of more powerful type would be more effective. Our Minotaurs should be re-engined and appropriated to this service.

Third-class cruisers.

We come now to the new third-class cruisers Bellona, Barracouta, and Barrosa. In these vessels, as in the classes already described and criticised, there seems reason to apprehend that more has been attempted that it is possible to give in ships of their limited dimensions. The Bellona is being built by Messrs. Hawthorne and Leslie, on the Tyne, and the Barham at Portsmouth. They are sister ships of 1830 tons displacement, and are designed by Mr. White to realise the high speed of 19½ knots. The armament consists exclusively of quick-firing and machine-guns, and includes six 4·7-in. 36-pounder and four 3-pounder guns.

Bellona class.

Archer class.

The Tartar, Racoon, Serpent, and Mohawk were the representatives at last year's manœuvres of a class of small cruisers of which no less than twelve have been laid down. They were strongly recommended to Lord Northbrook by the late lamented Sir Cooper

Key and his naval colleagues. It was desired to secure a speed and coal endurance far exceeding what had previously been attained in vessels of similar dimensions, combined with an armament of sufficient power to deal with any raiders upon commerce likely to be met with on distant foreign stations. The Archers were intended, when acting independently, to give protection to commerce. They were to be the scouts or look-out vessels of a fleet. In battle, as sea-going torpedo-vessels, it was believed that they might be effective auxiliaries to the heavy ships. It cannot be said that the result has been a failure. The speed on the measured mile was 17·5 knots.

Brisk's performance. Recently the Brisk steamed the 1200 miles from St. Paul's to St. Helena in four days and one hour. During the trip she did her four hours' full-speed trial, covering a distance of 60 miles in a rather heavy sea and with a full stock of coal, water, and provisions on board. At a cruising speed of 10 knots the coal endurance of the Archer class is 7000 knots. In proportion to their tonnage they are powerfully armed. Having referred to the good points of the class under consideration, it must be admitted that they have faults common to many smaller cruisers of modern design. In the construction of the hulls economy of weight has been carried to excess. The plating is too thin for durability. The armament is overdone. In a sea-way the heavy top-weight causes loss of speed, and throws an undue strain upon the light structure on which it is placed.

It has recently been stated in the *Broad Arrow*, that in going to the Cape from St. Helena the speed of the Brisk when meeting a strong head wind and sea was reduced to 5 knots, as the vessel was being buried under water forward, the forecastle bending down three or four inches under the weight of water. On another occasion the Brisk was steaming before a strong wind, and was taking in so much water on the poop that she had to be turned round, and steamed against the wind and sea for thirty hours until the weather moderated.

For ocean service the absence of sail must be often felt as a great disadvantage in cruisers of all classes. By the judicious use of canvas cost may be economised. In blowing weather canvas would greatly improve the behaviour of ships both in scudding and when laid-to.

Inconstant, Shah, Raleigh. In closing the descriptions of the cruiser class a few remarks may not be superfluous with reference to some of the older cruisers assembled in the great muster at Spithead. The Inconstant was built many years ago as an answer to the Wamponoag, a cruiser

built for the United States Navy, of whose performances sensational reports had been brought to this country. The Inconstant, Shah, and Raleigh can no longer be reckoned in the category of vessels of war; their large complements of 600 men should not be exposed to the risk of annihilation in action in a wholly unprotected ship. In a training squadron for young seamen the Inconstant would find her appropriate place. The Shah, Raleigh, and Inconstant are fairly evenly matched. They possess the sailing qualities of the finest clippers of the mercantile marine.

First-class torpedo gunboats.

Having dealt with the larger classes, we come to the torpedo gunboats. At the Review at Spithead, the Sharpshooter, 735 tons, was the representative of 12 vessels of the same class. All four of the smaller vessels of the Rattlesnake type, 525 tons, were present. We advanced by a long stride from the torpedo-boat to the first-class torpedo gunboat; the increase of size was shown to be necessary by the experiences gained in the abortive effort to keep a flotilla of torpedo-boats in company with fleets of large ships. The Rattlesnake was the most successful of the vessels engaged in the manœuvres. A writer in *Blackwood* reported that she maintained high speeds in all weathers, she was never sick or sorry, and she did an immense amount of work. It is said that her builders—Messrs. Laird Brothers, of Birkenhead—were fined £1,000 by the Admiralty as a punishment for making her engines somewhat overweight. It is to be hoped that other contractors will follow the example of the Messrs. Laird, as such a course must prove a double economy to the country.

Rattlesnake.

The Rattlesnake and the Sandfly, under able command, were remarkable for efficiency and seaworthiness. The *Broad Arrow* of August 24th, 1889, pays a gratifying tribute of praise to these little vessels and their commanders.

Performance of Rattlesnake and Sandfly.

"The Rattlesnake has redeemed herself, and her commander may be congratulated upon his exploit in the gale of the 15th August. He has shown that a vessel of this description may keep the sea in any weather, a test through which the Sandfly also has come with equal *éclat.* That both commanders displayed great tact and seamanship is true equally of the Sandfly and the Rattlesnake, for though the former, in passing to and fro between Waterford and Milford, and then in going upon that tempestuous Saturday night voyage to Lundy Island, did not encounter hostile cruisers, yet she weathered as pretty a breeze as could blow in that open waterway. The satanic behaviour of the Rattlesnake in front of Admiral Tryon's cruisers, however, is altogether delightfully dramatic, and the story of the

malicious race round her pursuers, yet keeping out of range of fire, is good enough for the genial pages of the heroic literature on which the sailor of the future loves to roam."

Another long stride in advance was made from the Rattlesnake to the Sharpshooters. The Sharpshooters are expected to steam at 21 knots; they have a coal supply for over 3000 knots. They offer to the sea a lofty bow, which should prove of immense advantage in the maintenance of speed in a sea-way. The following description of the new type of first-class torpedo gunboats is reprinted from the *Times*:—"They were designed by Mr. W. H. White, Assistant Controller and Director of Naval Construction, and have been built entirely of steel. They are 230 feet in length between perpendiculars, 27 feet in breadth, and draw 8 feet of water forward, and 8 feet 6 inches aft. They have a displacement of 735 tons, and the weight of their hulls when ready for sea will be 320 tons. The ships are fitted with a top-gallant forecastle, but have no poop. A highly-elevated conning tower is placed forward, upon which the electric light will be fitted. They are well provided with watertight compartments, and a bulkhead partition runs fore and aft, dividing the engine-rooms, for the protection of the vessels in case of accident. Working under forced draught their engines are to develop 4500 horse-power, and to propel them at a rate of 21 knots, so that they will rank with the fleetest vessels in the Navy. The natural draught power of the engines is 2500, with a speed of 18·75 knots. The engines are of the triple-expansion type. The vessels are unarmoured, but protection will be afforded to their engine and boiler compartments by the coal-bunkers, which are fitted on each side, while the boilers are also protected by coal-bunkers passing over their tops. The armament of the vessels will consist of two of the new 4·7-inch quick-firing guns, mounted at the stem and stern respectively, and four 3-pounder quick-firing guns, mounted at the broadside. They will also carry tubes for discharging Whitehead torpedoes, one being at the bow, and two at each broadside. The vessels will be fitted with steam steering-gear, electric light machinery, distilling apparatus, torpedo air service, and all other recent improvements. They are provided with storage accommodation for 100 tons of coal, which is sufficent to enable them to steam 2500 knots at an economical speed of 10 knots. The vessels will have two masts, which will be lightly rigged."

Sharp-shooter class.

Armament.

Coal stowage.

As yet the trials of these new torpedo gunboats have not been satisfactory: the anticipated speed has been realised, but the hulls have shown weakness.

The reason is not far to seek why the Sharpshooters and Rattlesnakes are enabled to reach a rate of speed under steam not attainable in any of our numerous classes of cruisers. In the latter, loaded as they are with a heavy armament, ample beam and full lines are necessary to ensure stability. In the torpedo gunboats, on the other hand, the gun armament is reduced to one or two light pieces. In the Sharpshooter, with a length of 230 feet, the beam is kept down to 27 feet. In the Rattlesnake the length is 200 feet, beam 23 feet.

Seagull class.

During their trials the Seagull class have given much trouble with their engines and boilers in cooling down after a turn of speed. Serious leakages have developed themselves in the boiler tubes. One observation is obvious: it is, that to get satisfactory results from locomotive boilers working in groups, and light high-speed engines, thorough training and much practice is necessary. The manning of the torpedo flotilla must be made a special service, and every officer and man must be thoroughly trained in the use of the complicated engine of war entrusted to his hands. The structural strength of the hull, too, has not been sufficient to stand the strain from the engines when working at full power. These defects may be easily remedied; succeeding vessels of the same type will doubtless be designed of larger dimensions and with heavier scantlings.

French vessels. Dague class.

The pioneers of this class of torpedo gunboats are found in the French Navy. In 1885, eight vessels were laid down of the Dague type, 395 tons displacement, and 18 knots speed. These ships have been followed later by two larger vessels of the Leger type, 450 tons displacement, and a speed of 18 knots. Additional vessels of the same type were authorised in the Supplementary Estimates approved in July, 1889.

During the French manœuvres of last year, the sea-going torpedo-boats of the Bombe type, 395 tons displacement, were considered deficient in structural strength; the service at sea was so exhausting to the crews that it was considered necessary to allow a period for rest in harbour at least equal to the length of time spent at sea.

In England, as it has often happened before, we followed in the wake of the French constructors in the introduction of the new type; but, having adopted the type, we have gone for larger vessels, and we have built more rapidly than other Powers. We began in 1886 with the four vessels of the Rattlesnake type, 550 tons displacement, and 19 knots speed; we have now in progress, or completing, no less

than thirteen vessels of the Seagull type, 735 tons displacement, and 21 knots measured-mile speed.

The Italian constructors were early in the field as constructors of seagoing torpedo vessels. Built and building, the Italian Navy possesses the following formidable list:—Two vessels Folgore type, 317 tons, 20 knots; and ten vessels Aretusa class, of about 740 tons displacement, and 19 to 20 knots speed. Russia has one specimen, the Captain Sacken, 600 tons, and 20 knots.

Italian vessels. Folgore class. Aretusa class.

It was announced by Lord George Hamilton, in his last annual statement to Parliament, that eleven vessels for the Royal Navy and two for Australia were building from the Sharpshooter design. It was proposed to lay down four more torpedo gunboats in 1889–90. Vessels of this class are urgently needed, and in numbers.

Gunboats.

It will not be necessary to say very much about gunboats. A marked advance has been made in this class of vessel from those of a comparatively recent date. The most important additions to our large flotilla of gunboats are the nine vessels of the Goldfinch type. The following description is from *Engineering*:—" The vessels are, as usual, of composite construction; they will be masted, and the design will have a form which, while suitable for good sailing, is capable of attaining from 2 to 3 knots more speed than the older vessels of this class. Covering the machinery, boilers, and magazines, slightly below the water-line, is a steel deck $\frac{7}{16}$in. thick. It slopes to the sides to 3 ft. below the water-line, and is fixed to the frames by angle-bracket plates placed at 6 ft. intervals. This deck extends for about 64 ft. of the length of the ship. All the openings have coffer-dams round them. Protection is also afforded to the machinery, &c., by the arrangement of the coal bunkers on either side of the vessel and above the protective deck. The vessel has seven watertight bulkheads, the engines taking up one compartment, the boilers a second, and the magazines, &c., a third.

Goldfinch class.

" The following are the principal dimensions of the ship:—

	Feet.	Inches.
Length over all	175	0
Breadth	31	0
Depth moulded	14	6
Draught forward	10	0
" aft	13	0
Mean draught	11	6
Displacement	805 tons	

There are two decks extending from stem to stern, including the protective deck, and a poop and forecastle. The officers' accommoda-

tion is partly under the poop and partly on the lower deck aft, and under the forecastle sleeping berths are provided for the crew.

Machinery. "The engines are of the triple-expansion type, and are intended to develop 1200 indicated horse-power. The bunker capacity is to be 100 tons, equal to 2500 knots at a reduced speed of 10 knots. The

Armament. armament of the vessels is of the latest type. They will each have six 4-in. breechloading guns on centre pivot mountings. Two of these will be placed on the forecastle, two on the poop, and two in the waist of the ship. There will also be four Nordenfeldt field guns, two under the poop, and two in the waist, and two 3-pounder quick-firing guns. The magazines are all under the protective deck.

Rig. "The vessels are to be rigged as three-masted schooners. They have a feathering screw, so that they can be readily converted into sailing vessels without having the obstruction of the propeller."

Steam trials. The gunboats of the Goldfinch class have been going through their trials recently—in some cases successfully; in others the trials have been a series of breakdowns from failure of machinery and leakage of boiler tubes. It is certain that all these defects will in time be overcome. In the meantime, in reviewing the causes of the failure of machinery in the Navy, it is evident that the system of inviting a wide competition, and awarding contracts to the lowest bidder, tends to inferiority of workmanship.

Torpedo-boats. Admiral Albini on the torpedo as a weapon of war. The value of the torpedo-boat as an engine of war has been hotly debated. A pamphlet by Admiral Albini, late director of Naval Ordnance of the Italian Navy, entitled "Un Sguardo al avenire Navale," puts the argument against the torpedo-boat as strongly as it is possible to present it. He urges that the torpedo-boat of the small dimensions originally adopted has been found to be unseaworthy, that in proportion as it has been found necessary to increase the dimensions to secure seaworthiness, so the attribute of invisibility has been lost. The largest torpedo-boat is in the highest degree vulnerable. The only chance of a torpedo-boat escaping destruction is to be found in its insignificant size; with the advance in dimensions the attribute of invulnerability is lost. In the future, therefore, he concludes, the torpedo will be a weapon of the battle-ship, it will no longer be carried in special vessels. Having given the arguments of Admiral Albini, it may be urged in reply that the chances for the

The other view of the case. torpedo-boat may be better than he puts them. In fog and under cover of the darkness of the night, the torpedo-boats must be powerful instruments for coast and harbour defence. In the case of a bombardment, the torpedo-boats, concealed from view by clouds of smoke

hanging round the ships outside, would be able to deliver a formidable counter-attack. In an action at sea the smoke and the confusion would offer many opportunities for the torpedo-boat to deliver a fatal blow against a heavy ship. In the present state of Naval warfare, it may be presumed that the torpedo-boat must form a part of the force of every navy. Torpedo-boats are being built more or less numerously by all the Powers, and with a general tendency to increase the dimensions. The unseaworthiness of some of these boats has been recently illustrated by lamentable catastrophes which have occurred in the French Navy. In the month of March, 1889, one of their boats capsized off Toulon, and this accident was followed a few days later by the loss of another vessel on the passage from Havre to Cherbourg.

English torpedo-boats.

In the British Navy the growth of dimensions has been rapid. Our torpedo-boats of 1880 were of 28 tons displacement, those of 1886 advanced to 66 tons, those of 1887 to 90 tons. For the British Navy an excellent type of torpedo-boat for coast-defence service has been recently constructed by Messrs. Yarrow. This firm built a large number of the boats ordered during the Russian scare. They subsequently introduced an improved type. One of their later designs was placed under the command of Prince George of Wales during the recent manœuvres. This boat has been in commission more than two years, and has given great satisfaction. The speed with a load of 20 tons is 22·5 knots at the measured mile. **Yarrow.**

Messrs. Yarrow's boats built for the British Navy were fully described and illustrated in the *Naval Annual* for 1888–89.

Thornycroft.

Messrs. Thornycroft are not less successful as designers and builders of torpedo-boats. A boat of their construction, the Coureur, 148 feet in length, displacing 100 tons, has obtained the highest praise from French Naval authorities. The speed is 23 knots with full power and 18 knots with a single water-tube boiler; the draught of water is 4·6 feet, and the cost is £16,000. In a seaway on the occasion of a recent trial, when a boat constructed by Monsieur Normand, the celebrated Havre shipbuilder, was reduced to 8 knots, the Coureur was going 16 knots.

Our English builders have an able rival in Monsieur Schichau, of Elbing in Prussia, and many others on the Continent.

Submarine boats.

Submarine torpedo-boats continue to engage the attention of many ingenious minds. The opportunities for the effective use of such boats must be rare. The sphere of action must be restricted to harbours, roadsteads, and very narrow waters. The latest French production is the Gymnote. This boat in form may be compared to **Gymnote.**

an elongated spindle, with a length of 56 feet and a diameter of six feet, or just enough depth to allow a man to stand upright in the interior; the weight is nearly three tons, the motive power is an electric engine of 55 horses, from the plans of Captain Krebs, driven from three accumulators; the engine drives a screw. Some experiments were recently made in the roadstead of Toulon under the direction of Lieutenant Baudrey le Cautinerie. The vessel was able to keep under water at a depth of about eight feet, and by means of the gyroscope to steer a given course with mathematical precision. The distance was calculated from the number of revolutions of the screw. Painted in grey, the boat is quite invisible when sunk below the surface.

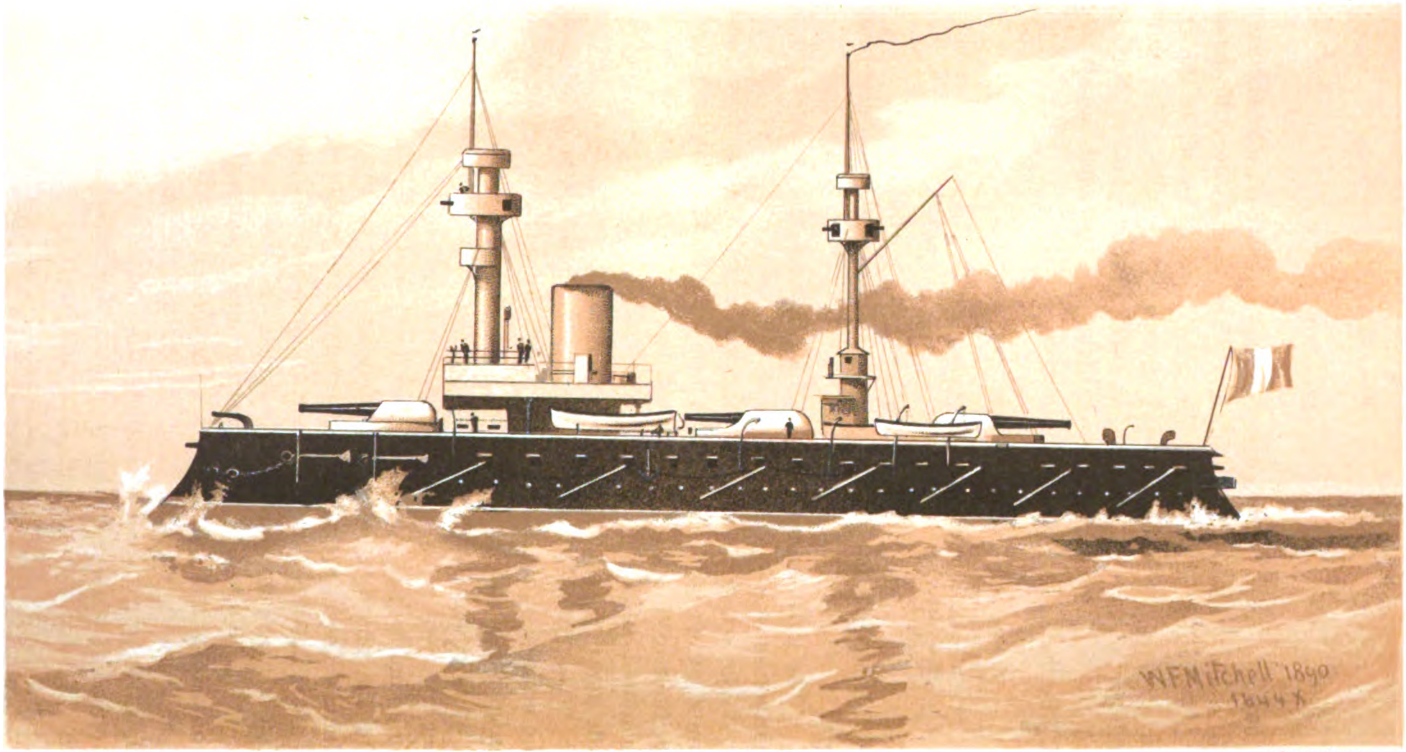
Trial.

The Spaniards have recently built a submarine boat designed by and named after Professor Peral, the Professor of Physical Science in the Marine Academy. The following description is from the *Army and Navy Journal* of New York of March 9th, 1889:—

Peral.

"The Peral was built in the arsenal of La Carraca, the keel being laid on Oct. 23, 1887, and she was launched on Sept. 8, 1888. She is shaped like a cigar, and measures 72 feet from stem to stern, and 9 feet in breadth. She is provided with twin screws, an electric motor, and tubes for discharging torpedoes. When completely immersed the flagstaff alone appears. Describing the vessel, *El Liberal* tells us that the captain is installed in the little conning-tower, from which, by means of a set of glasses of perfect transparency he looks in all directions, throwing light at will by the focus of the light under his control. In that tower he has a perfect index and register of all the operations and manœuvres of the ship. The ship has room for fifty persons in case of need, and a tall man can stand upright, and still leave the space of a hand's breadth above his head.

"In the final trial the Peral was to proceed to sea to blow up an old hull placed at a distance of some two or three miles, running a long distance under water, in search of the supposed ironclad. Recent telegrams from Madrid inform us that the Peral has successfully undergone this supreme ordeal in Cadiz Bay. The experiments were conducted with much secrecy. The Spanish Government will, it is reported, now order several vessels of this type for the defence of the coasts of the Peninsula."



GRIFFIN & Co. PORTSMOUTH.

"FORMIDABLE."
FRENCH IRON CLAD SHIP.

France.

BATTLE-SHIPS.

The following description of the recently-completed first-class battle-ship Formidable is from *The Naval and Military Magazine*:—

"The trial trips of this, the most powerful vessel in the French Navy, were attended with very satisfactory results. The ship was built in the national dockyard at Lorient on the plans of M. Godron; and the vessel was completed under the personal supervision of M. Marchal. Her principal dimensions are:— **Formidable.**

	Feet.	Inches.
Length between perpendiculars	321	6
Length over all	343	0
Maximum breadth at the water-line	69	6
Mean draught	26	2
Displacement	11,441 tons	

"Height of the heavy guns in turrets above the water-line, 8 ft. 3 in.

"The hull is constructed entirely of steel, and is armoured, in the manner shown on *Pl. 46*.

"The armour belt extends the whole length of the vessel, and it is joined at its upper edge by an armoured deck. The three barbettes are, moreover, strongly protected, the plates extending as far as the armoured deck. The captain is provided with a shelter, proof against rifle and light artillery fire. **Armour.**

"The engines are situated entirely below the armoured deck, and the most important parts of the vessel are sheltered as far as possible in the same manner.

"It is noteworthy that the Formidable is protected throughout by very strong armour. On the belt it is 21½ in. in thickness amidships, 16 in. at the bow, and 13¾ in. at the stern. On the turrets it is 17¾ in. thick, and the armoured deck is 3 in. thick. The armour consists throughout of Creusot steel. The largest plate is not less than 44 tons in weight—almost that of a torpedo-boat 108 feet in length, completely armed.

"The ship's bottom is constructed of a number of transverse ribs crossed by longitudinal ribs. The former are 2 ft. 6 in. apart from each other, and are covered on the outside and inside by plating, thus forming a double bottom. The latter is divided into a large number of watertight compartments. The barbettes are mounted on a strong foundation of steel plates and bars. **Double bottom.**

"In spite of the great increase of weight due to strengthening the

Weight of hull.

ship below the armoured belt, the hull of the Formidable weighs only 4200 tons, or about 37 per cent. of the total displacement of the vessel, while the armour alone exceeds 4000 tons. In wooden vessels the average weight of the hull was 50 per cent. of the displacement, and this proportion held good in the case of the first iron ships.

Propelling machinery

"The Formidable is driven by two sets of engines separated by a watertight bulkhead. The propelling machinery is not only protected by the armoured deck, but is also surrounded by the coal-bunkers. The engines, as well as the armour, were furnished by the Creusot Works. They are of the vertical compound 3-cylinder type, and indicate 6400 horse-power at ordinary and 8300 at forced draught. The average consumption of coal is equivalent to 2·2 lbs. per horse-power per hour. The engines are supplied by twelve tubular boilers, and are arranged in four rooms, separated by watertight bulkheads, protected, like the engines, by the armoured deck.

Armament.

"The Formidable carries three 37-cm. 75-ton breechloading guns, mounted in turrets, *en barbette*. This protects only the more delicate portions of the gun, while the movable turret completely encloses the latter and turns with it, leaving only a part of the muzzle unprotected. The guns of the Formidable are worked by hydraulic mechanism on the Farcot principle. In addition to these heavy pieces the Formidable carries twelve 14-cm. 3-ton guns in battery, and a large number of machine and quick-firing guns. The field of fire of the three 37-cm. 75-ton guns covers the whole of the horizon."

The Formidable is in commission in the French Mediterranean Squadron; at sea she has attained a speed of 15·2 knots.

A model of the ship was exhibited last year in the Paris Exhibition: the design is shapely but deficient in protection. It has been criticised by French writers as costly. The expenditure upon the hull was £656,000, on the machinery £81,800, and on the armament £80,000, total £817,800. The armament consists, as already stated, of three 37-cm. or 75-ton guns, and of twelve 14-cm. 3-ton guns; only one shot can be fired ahead and another astern once every ten minutes. When the heavy guns are in action it is necessary to withdraw the gun detachments from the light guns. At full speed the steering qualities are unsatisfactory. It is stated that the Formidable rolls enormously with a beam sea, and is an unsteady platform for guns.

Courbet was Foudroyant

The Courbet is similar in design to the Dévastation, and is practically an enlargement of the Redoutable. The designs were by M. de Bussy. The Courbet was laid down in 1875, at Toulon, under the name of the Foudroyant. The ship is built partly of

steel and partly of iron. The Courbet was launched in 1881, and completed in 1886; she has subsequently been attached to the Mediterranean squadron. Her principal dimensions are given in the Tables, Part II. The ship has an inner skin extending through the whole length, and up to the armoured belt the hull is divided into numerous watertight compartments. The thickness of the belt varies from 9½ to 15 in. Above the armoured belt an armoured deck of 2⅓ in. in thickness gives additional protection to the vessel. The armament consists of four 34-cm. 48-ton guns in a central casemate, four 27-cm. 23-ton guns on the upper deck in two half-turrets, two guns of light calibre are mounted one in the bow and the other on the stern, six 14-cm. 3-ton guns are mounted on each broadside, and 18 machine guns are mounted in various positions. The principal dispositions of the ship are shown in *Pl. 52.*

The Hoche was launched in 1886, and is now completed. She is built of iron and steel, with minute internal subdivision. The principal dimensions are given in the Tables, Part II.; and the ship and her sisters were described in the *Naval Annual* for 1887 (page 330). A speed of 16 to 17 knots is anticipated. The armament is skilfully disposed, and consists of two 34-cm. 52-ton guns in the turrets forward and aft, two 27-cm. 28-ton guns in the central turrets, fourteen 14-cm. 3-ton guns in the battery, and four similar guns on the spar deck, two firing in a line with the keel ahead and two astern; the light pieces are numerous; six are mounted in the central turrets, six on the central bridge, two others on the superstructure of the heavy gun in the after turret; in each of the tops two machine guns are carried, and others in various positions on the superstructure. The total number of machine and quick-firing guns is 45: five torpedo dischargers complete the armament. The belt is armoured with 18-inch plates. A model of the Hoche was shown in the Exhibition at Paris in 1889, and an illustration of her is given in this volume. The superstructure in the centre has three decks. The turrets are two storeys in height. The military masts are as tall and as wide in diameter as the minarets of a Turkish mosque. The ship seems deficient in freeboard. Hoche.

The three new ships of the Tréhouart type, to be constructed in private yards, will have a length of 293 feet; a breadth of 57 feet 5 inches; a depth of 24 feet; and a displacement of 6590 tons. The greatest thickness of the armour, which is to be steel, will be 17¾ inches. The armament, which will consist of two steel 34-cm. guns mounted in barbettes, one forward and the other aft; four 10-cm. quick-firing guns; four 47-mm.

quick-firers; ten Hotchkiss, and four torpedo-tubes. The engines will develop 7500 horse-power, and the estimated speed of natural draught is 16·5 knots. The armoured belt will be of steel, and similar armour will be used for the protection of the turrets. The armoured-deck will have a thickness of from 4 inches to 4¾ inches. It has been reported that two 27-cm. guns will be substituted for the 34-cm. pieces. It has been recommended to increase the freeboard forward. It has finally been recommended to diminish the thickness of the belt, and instead, to give increased protection to the upper works against the new explosives. The triple bottom ensures the unsinkability of the ship. The price to be paid to the Forges et Chantiers de la Méditerranée for their ship is £522,960; the cost of the other two ships, which are to be built by the Chantier de la Loire, at St. Nazaire, is to be £488,960.

Caiman class.

Among the ships lately completed for the French Navy there are four identical in type, the Indomptable, the Terrible, the Caiman, and the Requin; displacement 7230 tons, and carrying two 42-cm. 74-ton guns; speed 14 knots. Owing to the heavy weights in the bow and stern it is said that the behaviour of these vessels at sea is unsatisfactory. When the squadron, under Admiral Peyron, was making the passage to Algiers with light westerly winds, the Indomptable was unable to keep company with the squadron, although the torpedo-boats experienced no difficulty. A model of these vessels was shown at the Exhibition in Paris last year. The freeboard appeared insufficient to allow of speed being maintained in a sea-way; the central battery is entirely undefended, and the two heavy guns much exposed.

Armoured gunboats. Grenade class.

The four armoured gunboats of the Grenade type are the last ironclads which it will be necessary to notice. The principal dimensions are given in the Tables, Part II., and the Plan, *Pl. 45*, will give an accurate general idea of the design. These gunboats have been spoken of with favour in the French professional journals, as combining considerable means of attack and defence in proportion to their small displacement of 1045 tons. The opinion is held that the design is superior to that of the German gunboats of a somewhat greater tonnage. The French vessels have a steel belt of greater thickness than the iron armour belt of the German vessels. The gun, though less in calibre, has a penetrating power equal to that of the German 12-in. 35-ton gun. The French vessels have a speed of 13 knots, as against 9 in the German, and the coal endurance at a speed of 10 knots is much superior. The steering qualities of the Grenade are entirely satisfactory. As a

floating defence for the coasts and harbours these vessels would render excellent service. On the whole it must be admitted that they realise in their particular type the desideratum of every constructor, which is to give with the least displacement possible the maximum of fighting efficiency.

First-class cruisers. Alger class.

The Jean Bart, built at Rochefort from designs by M. Thibaudier, was launched in October 1889. Principal dimensions: length 346 ft., beam 43 ft. 6 in., draught of water 19 ft. 6 in., displacement 4160 tons, indicated horse-power 8000, speed 19 knots. The protection consists of an armoured deck and numerous watertight compartments. The armament comprises four 16-cm. 5-ton guns, six 14-cm. 3-ton guns, and ten quick-firers, and six torpedo-tubes. The Jean Bart was commenced in September 1887, and it is estimated that she will be advanced to $\frac{70}{100}$ths on the 1st January, 1890, and will be completed by the end of the year. The estimated cost is £283,240; hull, £184,000; engines, £88,000; armament, £11,240. A model of this vessel as exhibited in the Paris Exhibition showed that the ship would be covered in forward and aft. The armament in the bow is weak, the broadside is well armed; the protection is secured by a thin armoured deck; amidships above the waterline coffer-dams filled with cellulose are fitted. Much ingenuity has also been bestowed in securing protection by means of coal armour.

Amiral Cécille.

The Amiral Cécille, a first-class cruiser of 5766 tons, described by the Plate and the Tables in Part II., has completed her trials, and realised a speed of 20 knots with forced draught.

Sfax.

A model of the Sfax, a first-class cruiser of 4488 tons, and one of the earliest of the French deck protected ships, was exhibited at the Paris Exhibition in 1889. The protection is given by a thin armoured deck, by much internal subdivision, and by internal longitudinal bulkheads.

United States.

Vesuvius.

It may be convenient to give in this place the following particulars from *Engineering* of the dynamite gun cruiser the Vesuvius, which has lately attained a mean speed of 21·646 knots on the measured mile. The following are the principal dimensions:—

Length	$246\frac{1}{4}$ ft.
Breadth	$26\frac{1}{2}$ „
Depth	$14\frac{1}{12}$ „
Mean draught	$9\frac{8}{12}$ „
Displacement at this draught	810 tons
Tons per inch at load line	10·15 „
Midship section	177·5 sq. ft.

"The armament consists of three pneumatic dynamite guns 15-in. in diameter and 54 ft. long. Each gun will throw a shell charged with 200 lbs. of dynamite a distance of a mile once every two minutes. Two revolvers, one for storage and one for firing, and each carrying five projectiles, are placed directly in the front of the breech-piece of each gun. The revolvers are turned, when lowered to load, by an hydraulic motor. The projectile is moved from the firing revolver into the breech by an hydraulic ram, and the breech-piece is raised and lowered by the same means. The guns, with the exception of the breech-pieces, are built into the ship, and can only be trained by moving the vessel.

"The shells are launched through the air, and are dropped, if possible, into the sea alongside the enemy's vessel; they are fired by electric fuses, which are rendered active by the water; percussion fuses are also provided.

Vessel.	Displacement.	I.H.P.	Speed.	Nature of Trial.
	tons.		knots.	
Vesuvius	811	4366	21·65	2·54 knot run.
Ilyn	600	3550	20·10	1 knot run.
Tripoli	860	3016 (4040	19·80 21·00	" Unofficial.)
Destructor * (light draught) .	358	3829	22·6(?)	"
Destructor * (normal draught) .	458	..	20·2	"
Sharpshooter	735	4500	21(†)	"
Rattlesnake	550	2869	19·50	1 knot run.
Bombe	320	2000	19·50	"

* Performance of this vessel reported by builders only; no official report published by Spanish Government.
† Estimated; not yet tried.

The dynamite gun trials. "The Vesuvius was tested at Philadelphia. The requirement was that fifteen shots should be fired within thirty minutes. The actual performance was the discharge of fifteen shells, each 8 ft. long and 15 inches in diameter, with a capacity of 200 lbs. of explosives, without the slightest trouble, in 16 minutes and 11 seconds. The air pressure was ample to repeat the discharge. The initial pressure used was 750 lbs., although the reservoirs can supply 2000 lbs., and the contract permitted 1000 lbs. The fall of the pressure on the

firing ranged between 70 lbs. and 120 lbs. Firing a broadside, the Vesuvius can discharge 1500 lbs. of dynamite within a minute. The Vesuvius had previously demonstrated her accuracy of fire, and her speed is 21 6·10 knots per hour.

"The secondary armament includes two 3-prs. and some smaller pieces.

"The trial took place on January 12, 1889, when, with a steam pressure of 160 lbs., the engines developed 4366 horse-power at 278·8 revolutions. The measured course was 2·543 knots, and was laid off outside the Delaware breakwater. Going with the wind and tide the boat made a speed of 22·94 knots, and on the return trip a speed of 20·34 knots, or a mean speed of 21·64 knots per hour." Steam trials.

The above comparative table is extracted from a pamphlet published by the William Cramp and Sons' Ship and Engine Building Company, of Philadelphia, the constructors of the Vesuvius. It gives the performances of the leading torpedo cruisers of the world.

The Vesuvius carries thirty torpedoes, each loaded with a much larger charge than the locomotive torpedoes of her rivals. She has thus not only an advantage in the number of her projectiles, but also in their power. The machinery of the Vesuvius was designed by Mr. Horace See, of Philadelphia.

CHAPTER XIII.

The Older Ironclads.

It has been the fashion to condemn the older ironclads as obsolete in armour and armament, and not worth repair. Recent experience has brought out the merits of the older, and the defects of the more recent types. The compiler endeavoured to place his estimate of the value of the older ships in a letter describing the fleet as seen at Spithead, published in the *Times* on the 28th of August, 1889, which it may be appropriate to reprint:—

Compiler's letter to the *Times*.

"The recent naval inspection at Spithead has been a spectacle which has made glad the heart of the English people. It elicited acknowledgments from a friendly and powerful ruler highly gratifying to our national pride. While the visible evidences of our strength are still fresh in the public recollection, to take the part of the critic is not a grateful task. It is not less a duty, and it is a duty specially incumbent on all who have been in their degree responsible for the creation of our existing Navy. It may be that in criticising some imperfections and errors of the past we may gather useful lessons for the future. It is in this spirit that I propose briefly to review the history of our naval construction as exemplified in the recent great muster of our forces at Spithead.

"It will be convenient to take the ships, at least approximately, in the order of date of their completion.

Black Prince, Northumberland, Hercules, Invincible, Iron Duke.

"The Nestor among the ironclads present was the Black Prince, completed in 1862. The next oldest ships were the Northumberland and Hercules, completed in 1868; Monarch, dating from 1869; Invincible, 1870; Iron Duke, 1871. These specimens of the earliest period of our armoured building are still in sound condition, as fit as they ever were to go to sea. They are deemed capable by the Admiralty of taking their part in manœuvres intended to illustrate the most modern practice in the conduct of a naval war, and, though not up to date in all the particulars which constitute fighting efficiency, their most serious defects happily are remediable. It is in their armament and machinery that they are obsolete. The hulls are in good condition. The disposition of armour, as adopted in the

oldest ironclads and abandoned in later vessels, to secure greater thickness over the vitals, seems likely again to come into favour as the best defence against quick-firing guns and melinite shells. If the spars were reduced, it might be practicable to increase the protection by fixing thin steel plates as an outer skin to the present armour. Fitted with powerful triple-expansion engines, we might confidently look for a speed of 16 knots in the Black Prince, Warrior, and Achilles, and in the Northumberland and two sister ships. The coal endurance, a quality not less important than speed, would be largely extended. The armament should be modernised by substituting numerous light breech-loaders for the present heavy muzzle-loaders. A turtle-back should be fitted forward in the ships without forecastles. With these improvements, which it would not take long to carry out, time being a most important point, the oldest ironclads on the new list would become perfectly capable of doing good service.

Admiral Hollman's opinion of Hercules.

"If the Northumberland class are worth new engines, with still greater confidence may it be recommended that the Hercules should be similarly treated. In speaking of the fleet which he had been carefully inspecting at Spithead, Admiral Hollman, the distinguished representative of the Navy in the suite of the German Emperor, was enthusiastic in praise of the Hercules, as being in respect to the distribution of armour and sea-keeping qualities among the finest specimens of British naval construction.

Comparative coal endurance.

"It is interesting to compare the coal endurance of ships with old engines and those with new. The indicated horse-power of the Hero and the Conqueror is 6050. That of the Hercules is 6750. With a coal supply of 620 tons the former can steam 5200 knots at 10 knots. With a coal supply of 610 tons the Hercules can steam 1760 knots.

Invincible class.

"The Iron Duke and Invincible were the representatives at Spithead of a class of which there are not less than five in the British Navy. They date from the same period as the Hercules. They express the same ideas in the construction of battle-ships, with the inferiority of individual power which inevitably follows from a reduction of displacement from the 8680 tons of the Hercules to the 6010 tons of the Iron Duke and Invincible. Obsoleteness of armament, still more, deficiency of speed, and, graver still, inadequacy of coal endurance, which in the Invincible is only 1580 knots at 10 knots, are the main practical defects of the class. Whether sent abroad or retained at home, the improvement in speed and staying powers, which would be secured by the substitution of modern for obsolete engines, would add enormously to the efficiency of these vessels. It is not going too far to say that in their present condition

they are almost useless, even to admirals so fertile of resources as Admiral Sir George Tryon and Admiral Baird.

Monarch.

"Coeval in date with the Audacious class, and, like them, protected by thin armour, the Monarch is still a highly effective type as a second-class ironclad. With her present machinery the coal endurance of the Monarch is limited to 1500 knots at a low cruising speed. The range of action is miserably insufficient for the practical requirements of war. The Monarch should be fitted with modern engines of the most approved type.

Neptune.

"The Neptune, another high freeboard turret-ship, similarly but somewhat more powerfully armed than the Monarch, ten years later in date, and with the thicker armour which the advance in gunnery had rendered necessary, shares with the Monarch the cardinal defect of insufficient coal endurance. She can steam 1480 knots at 10 knots. Modern engines are indispensable for efficiency.

Reasons for fitting new machinery in the older ironclads.

"Many weighty reasons may be urged in support of the proposal that every armoured ship in sound condition should be promptly fitted with engines of the most approved type, and with modern, but not necessarily heavy, guns. Our present superiority, such as it is, consists in ships of the older types. No Board of Admiralty could venture to erase these ships in their present sound and seaworthy condition from our short list of effective ships. If we keep them on the list, it is our first duty to make them, as far as may be, equal to the highest standard of efficiency. It is to no purpose to lavish money on the minor armament, on electric lightning, torpedoes, and torpedo-nets, if we leave the propelling machinery, on which all depend, in a state of inefficiency. Everything in naval war, as the manœuvres of each year clearly go to prove, turns on speed. A competent authority, Sir John Hay, puts the criticism suggested by the recent muster of ships at Spithead in a nutshell. 'There is,' he writes, 'a grand display; but those who are in the secret know how small a value to put on some of the ships. Without speed, speed, speed, where are you?' May we not add, Where are you without that coal endurance which can alone enable ships to keep the sea? To make our existing ships efficient is the quickest and cheapest way of giving a reinforcement to the Navy. The Government have put before the country a programme of construction which will do much to strengthen us in fast vessels. Years must elapse before the new scheme of building has been achieved. The ships we have ready to our hand should be forthwith re-armed and re-engined. The policy of replacing the present boilers with others of the same class from which all the progress achieved in late years in the economical use of

Sir John Hay's opinion.

steam is conspicuous by its absence is a half measure and certain to be unsatisfactory."

Compiler's views supported in *Broad Arrow*.

The compiler is supported in the views which he has from time to time put forward, by able writers in the Naval Press commenting on the discomfort of the crews in vessels of the Admiral class during the manœuvres. The *Broad Arrow* remarks in a recent article that if we were obliged to confine our seamen to vessels of the Howe class, the boasted physique and *élan* of the British blue-jacket would very quickly be on a par with that of the town apprentice.

The sufferings endured during the manœuvres were caused by the closing down of hatches, which must always be done in a seaway in ships of low freeboard. Under similar conditions life on board ship in the tropics is unendurable. On board the Agamemnon, which was despatched from the Mediterranean to re-inforce the East Indian Squadron during the blockade of the Zanzibar coast, at one time 80 men were on the sick list, including seven officers, out of a total complement of 400.

Quick-firing guns.

The introduction of quick-firing guns in large numbers in the armament of ships, and the recent experiments against the Resistance, have done much to change the current of naval opinion in reference to the method of protection.

Lieut. Staunton on side armour.

Lieutenant Staunton of the United States Navy, in a paper on the manœuvres of 1888 published in the General Information Series, remarks that—

"Discussions of the probable effect of modern projectiles brought to the front several criticisms of the system of partial armour.

"*Broad Arrow* said that it was curious that the development of unprotection should have gone so far in England with the knowledge existing of the fearfully destructive effects of shell fire. British officers exclaimed, after the slaughter at Sinope of Turkish sailors by Russian shells, 'For God's sake keep out the shells.' A correspondent gave expression as follows to the opinion of the Rodney's officers respecting that ship: 'With nothing protected but her engines magazines, and barbette guns, her decks would be a regular shambles in action.' The attention called to the subject by the manœuvres developed a growing conviction that light side armour is essential to fighting a ship to the best advantage; otherwise she may be placed out of action through loss of men.

"This conviction was strengthened by the Resistance experiments which took place at Spithead while the squadrons were assembling."

We turn to a correspondent of the *Army and Navy Gazette* for the following description of the result of the Resistance experiments:—

Resistance experiments.

"I was on board the Resistance the other day at Portsmouth. She seems to be in much the same state as she was immediately after the last series of experiments upon her, save that a few of her outwardly visible wounds have been patched up or covered over. I can only describe the scene between decks as awful. It is, of course, impossible to distinguish the damage done by any particular shell, but the general effect of the firing has been to create a spectacle of devastation that is not short of marvellous. I doubt whether any living thing could have survived the destruction wrought by some shells which apparently entered by the stern windows. Beams are twisted and splintered, bulkheads are smashed to bits, and everywhere there are the marks of fragments of shell. The side-armour has been pierced quite cleanly by the 6-inch solid projectiles. There is only a slight inward turning of the outward edges, and a little puckering of the iron. Inside, the hole is much larger and more ragged, and the backing has been smashed and splintered all over the deck. I believe that the armour caused all shells that struck it to burst outside, where they did very little harm. If thin armour such as that of the Resistance affords this amount of protection, I should like to see all war-ships carry it over their batteries. Unless they do so, I feel confident that a single shell bursting in a battery might easily put every gun out of action by destroying the crew to a man."

New views as to guns favour the older ships.

The new views in relation to armament make in favour of the older ships. Heavy guns mounted in pairs in two turrets which a single shot would put out of action, and the hydraulic machinery required for loading, so ill-adapted to endure the tough treatment of battle, have fallen out of favour. Moderate calibres are now preferred, admitting of a large increase in the number, and a wider distribution of the guns. The ironclads of the first period of armoured construction respond much more closely to the new demands than do the later central citadel ships.

It is satisfactory to be able to record the steps which the Admiralty have taken in the present year to put some of the older ships into good repair and to supply them with modern machinery and guns. It was chiefly in their engines and their armaments that the ships were obsolete. Among the broadside ships which have recently been taken in hand are the Achilles, the Minotaur, the Alexandra, and the Superb.

We reprint the following from the *Times* :—

Alexandra.

"The Alexandra, which is one of the finest masted battle-ships in the Royal Navy, returned to England in the spring of 1888, after

twelve years' service as flagship on the Mediterranean station. A survey of her boilers showed that they were in a defective condition after such a lengthened term of continuous service, and new boilers are being fitted in their place. The armament of the Alexandra is also to be improved by the substitution for her four 25-ton muzzle-loading guns of four 9·2 inch 22-ton breech-loading guns of the latest pattern. In addition to those weapons she will in future carry eight 18-ton muzzle-loading guns, six 4-inch breech-loading guns, and fourteen 3-pounder and 6-pounder quick-firing guns. When fully equipped and ready for sea, it is anticipated the Alexandra will be able to steam 15 knots on the measured mile, and to maintain a seagoing speed of 14·25 knots. The Alexandra was completed for sea in 1876 at a cost of £653,915, and £110,706 has since been expended in keeping her efficient for foreign service.

"The Superb returned to England about two years ago, after seven years' service on the Mediterranean station. She has since had her engines and boilers removed, and has been fitted with new triple-expansion machinery, which it is hoped will considerably improve her speed. The old engines of the Superb were of 6580 horse-power, but her new machinery is to develop 8500 horse-power under forced draught, with a speed of 14 knots, and 6000 horse-power under natural draught, with a speed of 12½ knots. The armament of the Superb is in future to consist of sixteen 18-ton muzzle-loading guns, six 4-inch breech-loading guns, and sixteen 3-pounder and 6-pounder quick-firing guns. The total cost of refitting the Superb and supplying her with new machinery is estimated at £119,298. When ready for sea it is expected that she will be commissioned to strengthen the Channel Squadron." Superb.

In the case of the Superb, the saving of weight from the fitting of new compound machinery was estimated at 300 tons, while the distance which the ship could steam with a given quantity of coal was doubled.

An estimate of £34,513 for refitting the Achilles, at Devonport, for future service, has been approved. This estimate is exclusive of new boilers, which are to be placed on board at a cost of £12,587, the total cost of the refit being £47,100. Achilles.

The repairs of the Minotaur call for special notice, it having been decided to give this ship new boilers, necessitating the heavy expense of opening the decks. It is much to be regretted that as a measure of economy the old trunk engines and jet condensers are to be retained—the new boilers will be as wasteful of fuel as the old, and the speed is not expected to exceed 13 knots an hour at sea. The Minotaur.

protection of commerce *en route* from the Cape, Aden, or Ceylon across the Southern Ocean to Australia is the proper sphere of the ships of the Minotaur class. On such a service it is desirable to secure the highest attainable results in speed and economy of coal consumption. With triple-expansion engines and boilers of increased steam pressure, the six ships of the Minotaur and Warrior classes could have been brought up to 16 knots speed—their great length would have enabled them to keep their speed on the ocean in conditions of sea which would tell heavily against the shorter ships of a later date. The earlier ironclads are in sound condition, they are well built, and would last longer than many lighter ships, which are too slight in scantling to bear the strain of constant steaming in a seaway. The Minotaurs are also worth improved armaments and light breech-loading and quick-firing guns.

Speed not kept up in the shorter ships. Lieutenant Staunton's report to the United States Naval Department on the manœuvres of 1888 may be cited. Referring to the difficulty experienced by short ships, such as the Rupert, Shannon, and Inflexible, to keep up their speed, he remarks that the Agincourt, an old ship, was steaming easily at the time under two boilers.

The old ships in fact seem to have done very well. The vessels that appeared to travel with the greatest ease and least smoke in Tryon's squadron were the Black Prince, built in 1861; the Hercules, in 1868, and the Devastation, in 1871.

Penelope. The recent performances of the Penelope, an ironclad which has often been put aside by critics as hopelessly obsolete, may be quoted in support of the recommendations which it has been sought to press on the consideration of our Naval authorities. A writer in the *Army and Navy Gazette* reports that the Penelope had made an average of 12 knots an hour in a passage of 90 miles between Table Bay and Simon's Bay.

Rupert. Turning to ships of a somewhat later date, the Admiralty have decided to fit the Rupert with new expansion engines and boilers, and a new armament is to supplied. Her new engines are to develop 6000 horse-power under forced draught, and will propel her at a speed of 14·23 knots. The natural draught power will be 4500, with a speed of 13·5 knots. The 25-ton muzzle-loading guns in her turrets are to be removed, and replaced with two 9·2-in. breech-loading guns of the newest type. She will also carry two 6-in. breech-loading guns and ten 3-pounder quick-firing guns.

Hotspur. The Hotspur, of 4010 tons, completed in 1871, and Rupert, 5440 tons, 1874, are contemporaries of the Devastation. On their inferior dimensions it would not be reasonable to look for the fighting power

of first-class battle-ships. Their most suitable sphere of action will be found in the Channel and in coast defence. Even within these limits their speed and coal endurance—920 knots for the Hotspur and 1340 knots for the Rupert—fatally impair their efficiency. These two ships are worth improved machinery.

Cyclops and her class.

One more vessel remains to be mentioned. The Cyclops, one of the four harbour-defence vessels built under Mr. Goschen, during the Franco-German War, has recently been fitted with a new superstructure at Devonport dockyard. The alteration will greatly improve the stability of the vessel and afford better protection to the crew when at sea.

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CHAPTER XIV.

The Construction of the Future.

Dimensions of ships.

In connection with the new programme of construction for the British Navy, the discussion of the relative advantages of large ships and ships of medium tonnage has been renewed of late, both at home and abroad.

In the construction of battle-ships of the vast dimensions which have been reached, the Italian Government led the way. The Italia, the Lepanto, the Re Umberto, the Sardegna, and the Sicilia, range from 13,851 to 13,251 tons. Our new first-class line-of-battle ships will be of 14,150 tons, and will cost before the pendant is hoisted more than £1,000,000. If the present writer deems it his duty to raise a question as to the policy of building monster iron-clads, it should be clearly understood that in regard to the vessels included in the programme recently authorised by Parliament, the controversy is closed. It is in anticipation of discussions which must arise in the future, that attention is invited to some recent expressions of opinion on the perplexing problem of naval construction for the purposes of war.

In his paper, published in the *Nineteenth Century*, for May, 1889, Lord Armstrong wrote as follows:—

Lord Armstrong's views.

"Although I am ready to commend the designs for these new ships, my distrust of the efficacy of all vessels of the armoured class in relation to their cost remains unchanged. All the advantage they possess in point of defence is a partial and imperfect protection against artillery fire. As regards rams and torpedoes, they are as vulnerable as ships without armour at all, and they are as liable to perish by the perils of the sea as any other kind of warship, while their cost is so great that the loss of any one of them from any cause amounts to a national calamity. Mr. White, in his paper on these new designs, refers to what he calls the 'too many eggs in one basket' argument, but he wisely adds that he leaves that argument to be dealt with by the Board of Admiralty, who are responsible on matters of policy, he being only their technical adviser. The

argument referred to is, however, undoubtedly possessed of great cogency, and, to my mind, the only justification for persevering in the building of such ships, is that foreign nations are still doing so."

The view that distribution of risk by multiplying ships is the best method of meeting the tremendous powers of attack which modern science has created, has been consistently maintained by Lord Armstrong. The latest practical representation of his views is to be found in the Piemonte. In this vessel, built, unfortunately, not for the British but the Italian Government, protection has been little considered. The aim has been to develop to the utmost the power of attack in a vessel of moderate tonnage and high speed. Arguing the question under consideration in connection with the Piemonte, the *Engineer* makes the following reflections:— Piemonte.

"For the money which will be expended upon each of the new first-class armour-clads, five or six Piemontes might be constructed. These vessels, compared with the armour-clad, would carry half as much more armament, would steam at four knots greater speed, and would be manned by about twice the number of men. Security against destruction by the ram, the torpedo, the gun, or by the perils of the sea is much greater in the case of the five or six ships than in the case of one ship. Having regard to the great variety of services such vessels may be employed upon, we cannot but think that in many instances the cruisers would be the better bargain for the country." Opinion of the *Engineer.*

And now let us turn to the opinions of some leading writers on naval subjects in France. In a series of articles on the large Italian ironclads, published in *Le Yacht,* M. Weyl has adduced some cogent arguments against the introduction of similar ships into the shipbuilding programme for the French Navy. By expanding dimensions, advantages are gained in speed, in armour, and in weight of armament; on the other hand, the largest and most powerful ship may be destroyed by a single blow from the torpedo, the ram, or the gun. M. Weyl would prefer to fight a close action with six ships of the Bayard type under 6000 tons rather than, with two ships of the Italia type of about 14,000 tons. The advantages of numbers in a *melée* would be overwhelming and decisive. M. Weyl's views.

Renewing his argument in connection with the English programme, in an article published on the 25th of January last, M. Weyl makes the following observations: "England is in its turn entering on the line of development which has been followed by the Italian constructors. The last completed ironclads of the Admiral class displace 10,600 tons. Their immediate successors, the Trafalgar and the Nile,

have a tonnage of 11,940, and a higher bow than the Admiral's. The Admiralty, not satisfied with the combination of speed, fighting power, and protection attained in the Trafalgar, called for the designs of the four large ironclads of 14,150 tons now being laid down. These vessels will have a freeboard of about 16 feet protected against sensitive shells, and a speed of 17 to 18 knots.

"In increasing the tonnage of their ironclads, the English have desired to improve the sea-keeping qualities of their ships, to give them more protection, more coal endurance and a high speed. Having taken their departure from a known and well-tried type, and advanced to the monster ironclads now approved—will they stop where they are? If any power builds ships of 16,000 to 18,000 tons, England will meet them with similar ships. They will not hesitate in deference to pecuniary considerations. Can it be the same with us (in France)?"

French programme.

The latest French programme of shipbuilding does not include any ships of dimensions equal to those of our largest ironclads. The following is a list of armoured and protected ships which will be in hand for the French Navy in 1891.

	Tons.
Brennus	10,826
Neptune Magenta	10,581
Tréhouart Bouvines Jemappes Valmy	6,700
Dupuy de Lôme	6,297
Charner Bruix Latouche-Treville Chanzy	4,745

M. Weyl gives the outlines of an ironclad which he thinks might be designed, of about the same tonnage as the Amiral Duperré, and which should be in speed equal to the Italian ironclads, with greater power of attack, and more protection. He would mount no gun heavier than the 27 centimètre, which is capable of piercing all the existing ironclads, and is more easily protected and worked than guns of heavier calibre.

The Nouvelle Revue.

A summary of the arguments against extreme dimensions has been recently published in the *Nouvelle Revue*, by Commandant Z. He quotes the following passage from Admiral Jurien de la Graviere: "Ironclad vessels will long continue to take that part in maritime war which Antigonus, Seleucus, and Eumenes assigned in the plains of Asia Minor to the huge animals trained by Taxila and Torus.

The elephants held their place in battle for nearly a century—they were withdrawn when the Roman Legion appeared. In the same manner, the armoured vessels are destined to disappear, but the hour for disbanding them has not yet arrived. I would associate with the heavy ships groups of small vessels. Their concentrated attack would cause confusion and trouble in a fleet of heavy ships. Dispersed, a single act of destruction would awaken anxiety in every shipowner of the country to which we might find ourselves opposed."

Amiral Touchard.

Commandant Z. quotes Amiral Touchard, the author of "La question du décuirassement:" "The hour has come for us to throw off armour. The removal of armour follows as an inevitable consequence from the increase in the power of the gun and its superiority over the means of defence. France should take the bold initiative which prudence and considerations of economy alike recommend. She led the way in a line less consistent with her genius and traditions in giving armour to her ships." Commandant Z. insists that the ceaseless progress of science since the period when he wrote gives an added emphasis to the words of Admiral Touchard. He maintains that if the most powerful vessel can be thrown out of action by two or three lucky shots with the new explosive, the plainest commonsense enjoins that we should throw aside these impotent naval giants. When attacked by melinite shells, their weight of armour is a source of danger. They should be replaced by vessels more effectually protected by their small dimensions and their extreme agility. Commandant Z. quotes from an able paper by Mons. Montechant:

Conclusion.

M. Montechant's arguments.

"It is with armourclads as with ships of less dimensions, all depends upon the captain. If he loses his head at the decisive moment, his ship is doomed to certain destruction. If instead of one giant, you have 10, 20, or 30 smaller vessels, costing as much as the single ironclad, you will have 10, 20, or 30 different captains. If some of these fail in battle in the qualities needed at that supreme moment, the greater number will stand ready to contend with the enemy for the palm of victory. By building small vessels, more effective use can be made of the various weapons of naval war. Our shipbuilding can be carried forward in conformity with the great law of division of labour and specialisation of tools. Let us give up the attempt to concentrate in a single ship all the weapons of offence, and all the means of resistance: let us be sure that the three main elements of success in the naval battles of the future will be speed, the distribution of attack, and superiority in the number of ships which can be brought into action.

Amiral Dupin.

Two able papers appeared in the *Revue des Deux Mondes* of June and July, 1886, from the pen of Amiral Dupin de St. André. Though written in answer to Mons. Gabriel Charmes, as the literary exponent of the views of Amiral Aube, Amiral St. André is opposed to all exaggerations, whether in ships or guns. He asks for (1) a torpedo flotilla; (2) a flotilla of sea-going gunboats; (3) squadrons of ironclads, cruisers, and sloops in suitable proportions. In ironclads he would not go beyond 4700 tons; in cruisers he would not go beyond 3400 tons; in armament not beyond a 16-ton gun.

French Council of Construction.

We have a weighty expression of official opinion in a memorandum of the French Council of Construction of the 7th of January, 1887.

(i.) A squadron being liable, under the new conditions, at any moment to unexpected attack by flotillas of torpedo-boats, it is absolutely necessary to provide special means for defence and for scouting.

(ii.) Torpedo-catchers, look-out ships, and cruisers will drive back the hostile look-out ships and undertake any distant cruises in which a certain amount of fighting power may be required.

(iii.) In compliance with these conditions, a squadron of six ironclads should be supported by at least two cruisers, four look-out ships, and six sea-going torpedo-boats.

(iv.) Our fighting fleet should, in addition to the ironclads for the line of battle, be prepared for the duties of coast defence and destruction of commerce.

(v.) For this double purpose we require cruisers, look-out ships, torpedo-catchers, sea-going torpedo-boats, special vessels of high speed, and, finally, coast-defence torpedo-boats.

(vi.) The additional force immediately required for the French Navy includes 16 cruisers, 20 look-out ships, 42 torpedo-catchers, and 2 torpedo-boat carriers.

German views.

The hesitation to sanction the construction of ships so costly as those now demanded by naval advisers has been strongly manifested in Germany. A Committee of the Reichstag on the proposals of the Government for an increased expenditure on shipbuilding, expressed regret that it should have been necessary to propose ships of 10,000 tons, each costing not less that £600,000. They suggest that ships of 6000 to 7000 tons, armed with two instead of four heavy guns, might have been more satisfactory. The Committee, however, declined to insist on objections of a technical character, recognising that whatever type might be adopted, additional ships were necessary for the German Navy.

The ships lately built and those now building for the Italian Navy, have been the subject of severe criticisms. They have been summarised by Signor Molli, the author of *Italia in Mare.*—The large ships of the new Italian Navy have cost in the aggregate more than nine millions sterling, and have occupied twelve years in construction. In the interval the type has become obsolete. The minor armaments of quick-firing guns are a new feature and necessitate different methods of protection. The Italia draws thirty-one feet of water, and with this draught Spezzia and Venice are the only ports in Italy which she can enter. Admiral Acton, as minister of marine, while deeming it his duty to vindicate the policy of his predecessors, admitted that a numerous flotilla of torpedo-vedettes and other auxiliaries was essential to give efficiency to the large ships.

Italian criticism of their own large ships.

It has long been the conviction of the compiler that the best results in fighting efficiency are not obtained in the ships of the largest dimensions. If the heavy ships have great offensive powers and can be more fully protected by armour, the arguments, as quoted from many high authorities, seem to incline the scale in favour of types of a less exaggerated cost, a greater number of which can be produced for any given sum of money. Whatever be the type, there remains, under all circumstances, a conspicuous advantage in the superiority in numbers.

The compiler's view.

The change in naval opinion on the question of armament makes decidedly in favour of the moderate ships. The change is due to many causes,—to the delays in delivery, to the diminished endurance of the heavy guns, and to the increased powers of the light and quick-firing guns.

Armaments.

Many considerations point to the desirability of putting a limit to the calibre of guns. It is essential to keep in view that the endurance diminishes as the calibre increases. The life of the 110-ton gun is stated to be 95 rounds, that of the 67-ton gun 127 rounds, and that of the 45-ton gun 150 rounds. The delicate machinery necessary for the training and loading might be thrown out of action by a single shot. The practice from guns which can only be fired at intervals of several minutes against ships moving at great speed must necessarily be uncertain. An increase in the size of the gun involves in an ever-increasing proportion an addition to the displacement of the ship. The size of the gun determines the size and weight of the hydraulic machinery for loading the gun, of the turret in which the gun is mounted, and of the ammunition which must be carried on service.

The following comparative table of weights of armament and accessories is from the *Army and Navy Gazette*:—

	Tons.		Tons.
Guns, ammunition, &c.	111	(four in number)	1448
Guns, ammunition, &c.	67	(four in number)	966
Guns, ammunition, &c.	45	(four in number)	670

French opinion.

In France, opinion is moving in favour of medium calibres. The Canet gun of 27 centimètres is regarded by many authorities as sufficiently powerful for the requirements of the Navy. The weight of the gun is 35 tons. It fires a projectile of about 550 lbs. at an initial velocity of 2296 feet, and has a penetrating power at 1200 yards of 24¾ inches, and at 2400 yards of 22 inches.

The direction in which English opinion is moving.

English opinion is moving in the same direction. It is understood that the 67-ton gun has been retained for our latest battle-ships, chiefly because we have a reliable pattern gun of that calibre. If the design for a gun of less weight, say of 50 tons had been thoroughly worked out it would have been accepted as sufficient. The ingenuity of our gunmakers could not be more usefully employed than in designing a gun of the most powerful description that can be constructed not exceeding the weight of 25 tons.

The limit of dimensions of guns must be determined practically by the work to be done. If the penetrating power is sufficient to attack the stoutest armour which ships can carry, it is better to increase the number of guns than to increase the calibres. The 10-inch 29-ton gun has a muzzle energy of 15,300 foot-tons, and is capable of penetrating 22 inches of armour-plate at 1000 yards, or 20 inches at 2000, and the 67-ton, has nearly double this power.

Advantages secured if the guns are of moderate size.

Against such ships as the Italia and the Lepanto, which even at the water-line are unprotected by armour, an armament of guns of medium calibres which can be rapidly pointed and loaded, would be much more effective than ordnance of heavier calibre. Superior destructive power at long ranges is of little practical value. A sea-fight under modern conditions will be fought at ranges not exceeding 1000 yards. With the introduction of guns of moderate calibre, we might look for many valuable improvements in speed, in coal endurance, in the amount of protection which could be given to the gun detachments, and in the reduction of displacements and consequent multiplication of the number of ships which could be built for any given sum of money.

Armour.

In connection with the subject of dimensions, it is important to note

that, with the utmost practicable increase of size, it still remains impossible to give complete protection.

Lieut. Singer of the U. S. Navy.

Lieutenant Singer of the United States Navy in his graphic "History of Armour Protection and Distribution on War Vessels," which we proceed to give in précis, has shown how every addition to protection is balanced by loss in some other element of fighting efficiency. In the first types of armoured ships, the hulls were completely protected by armour of sufficient thickness to keep out the shells which had dealt destruction among the Turkish crews at Sinope.

Monitors.

The introduction of the Monitor marked the next stage in the history of armour construction. It was made evident in the first action in which the Monitors were engaged that the new type possessed a fighting power not to be obtained in any broadside vessel of similar dimensions. Foreign powers at once adopted the Monitor. In England we were, as usual, slow to accept the change. The Alexandra was the last built central casemated ship.

French designs.

At the expense of gun protection, the French adhered to the complete water-line belt; but with the introduction of the high explosive shell, the danger was obvious of having the guns dismounted by explosions below the barbettes. In the Hoche the barbette with its light shield is changed to a completely covered barbette, or modified turret. Each of the four heavy guns is carried in a separate armoured position over an armoured redoubt. This arrangement of the primary battery is rather costly in weight of armour. In the new French vessels, the guns are to be mounted in pairs in turrets. The latest design, the Tréhouart, of 6700 tons, laid down at Lorient, is to be of a modified Furieux type, with turrets instead of barbettes.

Hoche.

Tréhouart.

Dupuy de Lôme.

After thirty years, the appearance of the detonating shell presents the same problem as that solved by the designer of the Gloire, and the newest type of completely armoured cruiser is aptly named the Dupuy de Lôme.

Italian designs. Duilio class.

The Italians have given up their separated gun positions. The Duilio and Dandolo are fitted with two turrets on a central citadel They have no secondary battery; the water-line belt is shortened up and disappears altogether in the Italia and Lepanto, the floating power depending on a cellular raft over a protective deck. In the newest battle-ships of the Italian Navy, the primary battery, consisting of four 16·97-inch guns, is carried in an armoured central barbette. The Italians in the Lauria class revert to the partial belt, with armoured decks, for water-line protection, and a strong central redoubt. In their latest types, of the Re Umberto class, the weights

Italia class.

Lauria class.

Umberto class.

of the original armour and fuel are to be reduced, and this reduction is to be put into side-armour protection against detonating shell, and projectiles from rapid firing guns. The floating power is maintained by cellular protection which extends down to the bilge, forming practically a triple hull. This is the first departure from the net to hull defence against torpedoes.

Russian designs.

The Russians, after building the Peter the Great, of the Devastation type, showed the effect of French influence by adopting the complete belt and barbettes. A reaction towards gun protection is

Tchesmé.

seen in the Tchesmé class, where the six heavy guns still en barbette are mounted on disappearing carriages in a triangular central redoubt. The complete water-line belt is given up, and the ends are deck protected. In some of their new constructions on the Black Sea, the Russians return to turrets, while on the Baltic the type re-

Alexander II.

presented by the Alexander II. is the favourite. To meet the new demands for resistance to detonating shell, armour on gun positions is reduced in thickness, and spread over a larger and continuous area. The Russians, so far, have not gone to extremes in the size of their heavy guns on shipboard—their largest calibre being 12-inch.

Return to English designs.

The English started in this decade by building barbette ships of the Admiral class. The *Edinburgh Review* has pointed out that in the days of the old wooden walls, battles were won by the destruction of life and limb. The ships which had most men killed and wounded surrendered. It was so with the French and with the Americans and it was so with the English; it was rare, indeed, to destroy the

Admiral class.

ships with artillery fire. In the Admiral class the 20 or 30 men required to work the four barbette heavy guns are all under enormously thick armour. The hundreds required to work the light guns are entirely unprotected. In all the early ironclads, the cry, "For God's sake keep out the shells!" has been operative; in the ships of recent date it is as if it had never been heard. French influence is shown by the battery distribution, and its protection in

Impérieuse.

the Impérieuse and Warspite.

Trafalgar.

The Trafalgar and Nile present a superior type of battle-ship. Most demands are well met, but the secondary battery is somewhat weak.

Our latest designs.

The latest designs of English battle-ships show modifications of the Trafalgar and Collingwood. The irresistible logic of events had forced the displacement above 14,000 tons.

It will be noticed that few, if any, armoured vessels with complete or partial water-line belts have these of sufficient depth to give the proper protection when rolling; this defect is minimised in the

large types of from 13,000 to 15,000 tons displacement, that do not roll appreciably in any seaway that permits ordinary vessels to work their guns. Another point is the incomplete protection given to the chase of the heavy and important guns even against light projectiles. The Russians, in the Tchesmé class, are enabled to have a disappearing mount for the 12-inch barbette guns by reducing their length from 35 to 30 calibres, a sacrifice pretty certain to be balanced by additional chance of life to the guns in action. So far, detonating shell have not been able to keep intact long enough to penetrate any but the lightest armour.

Russian disappearing guns in the Tchesmé class.

Having followed Lieutenant Singer in his review of the successive phases through which the history of armour has passed, we have seen how every design, and every new combination of the elements of fighting efficiency present at best a compromise between conflicting conditions. To give more protection to the vitals, the area protected must be proportionately diminished; to give more weight to armour, less weight must be given to armament and machinery; to give increased thickness to armour without a proportionate reduction in the area of protected side, an enormous advance in dimensions must be accepted with the consequent and most grave disadvantage of reducing the number of ships which can be built for a given sum of money.

Summary of Lieut. Singer's paper.

Impressed with the impossibility of giving effective protection by armour, many able men have held that it is better to throw off armour altogether. They are moved by the consideration that the advocates of armour have been compelled, as we have seen step by step, to reduce the protected area to the water-line and to a few positions for heavy guns, and finally to make a choice between protection of the water-line and protection for the battery.

The compiler is of opinion that armour is more necessary in front of the guns than on the water-line. M. Weyl may be quoted in support of this view. "We are free to confess," he says, "that we have become adversaries of the belt of armour at the water-line. The torpedo and the ram always strike below the belt, the gun sometimes hits in the same vital place." He recommends protection of the guns and the conning-tower with armour, and the placing of every heavy gun in a turret where protection can be better secured than is possible in a battery. He contends that in the French ships the heavy guns are not sufficiently protected; and that the system of protecting the gun-carriage with armour and the gun itself with a mere shield may expose the French ships to serious disaster in an engagement with an enemy well armed with quick-firing guns. To

The compiler's opinion supported by M. Weyl.

place a belt of armour in the neighbourhood of the water-line, while about four or five feet below that line a projectile might strike, or a torpedo may open a breach four or five times the width of the belt, is, he argues, only to burden the ship with an enormous weight in order to obtain an unsatisfactory and costly system of defence.

Sir N. Barnaby's proposal supported by Sir Edward Reed. Woodite.

Protection can be obtained at the water-line by other means than the use of armour. At the Institute of Naval Architects, in the session of 1889, Sir Nathaniel Barnaby proposed to keep the sea out of the ship by a cellular raft, filled with woodite. Sir Edward Reed gave to the proposed method his cordial approval. "The new material," he said, "brought before the meeting by Sir Nathaniel Barnaby, opened up a wide field in warship design, and it might be used with great advantage in many positions, to keep out the sea. It would be as effective for that purpose as if the side were protected by armour a yard thick. Sir Edward was glad to get back into a concerted line of opinion with his esteemed friend and relative, Sir Nathaniel Barnaby, whose ability and talent he had always recognised. It is evident that no armour with which it is practicable to protect the sides of ships will keep out shot from the heavy guns now carried in the smallest class of battleships. If the risk of perforation at the water-line must be accepted, a better defence than that offered by armour, will be found in the system of protection recommended by Sir Nathaniel Barnaby.

Naval officers have to weigh the chances.

Naval officers must make such an estimate as they can of the probabilities of battle. The naval constructors must do their best to protect the ships and their crews from the most imminent perils to which they are exposed. The chances are that hits from a heavy projectile between wind and water will be rare. It is certain that from machine and quick-firing guns, a hail of fire will be poured forth, which will in a few minutes batter down the unarmoured parts of ships, and annihilate the detachments stationed at the unprotected guns.

The compiler sums up.

Having summarised as impartially and concisely as we can the conflict of opinion on this difficult problem of protection, the compiler would follow Admirals Elliot and Ryder, Sir Nathaniel Barnaby, and Sir Edward Reed, in recommending a cellular raft and woodite for the protection of the water-line, retaining armour for the protection of the guns' crews from the fire of explosive shells. The efficiency of the proposed method of protection of the water-line should certainly be tested by experiment.

Auxiliary battle-ships.

In dealing with naval construction, we find ourselves face to face with a problem which must be considered under conditions changing

from day to day. We may have changes in the political aims and objects, or changes due to the progress of invention. New and improved weapons and engines quickly render obsolete the most complete and skilful creation of councils of construction and boards of naval officers. In a recent speech in the chamber of deputies, Admiral Krantz drew a gloomy picture of the difficulties experienced in France. In 1880 M. Gougeard gave orders for laying down six battle-ships. While the designs were being prepared, a change of view occurred. It was said that to engage in line of battle should no longer be the aim in the shipbuilding for the French Navy. The construction of two line-of-battle ships was accordingly suspended, and eight armoured gunboats were laid down. Two years later other ideas prevailed, and the cry was loudly raised for torpedo-sloops and torpedo-cruisers. No sooner was the construction of the armoured gunboats arrested and torpedo-cruisers laid down, than another change occurred. Work was suspended on all the ships in hand, and efforts were concentrated on a new class of swift cruisers. The explanation of so much hesitation is to be found in various considerations connected with the foreign policy of the country. Discussions have been raised as to the nature of the maritime war in which the country might be engaged. Sometimes the aim has been, as in 1881, to strengthen the fleet in line of battle. In the construction now in progress, means of cutting up our enemy's commerce receives the chief attention. As a necessary result, we have on our hands a number of vessels incomplete, and of different types.

Admiral Krantz as to French action.

It has been an easy task to state the objections to the building of ships of vast dimensions and cost. It is more difficult to suggest a design in which a reduction of size may be made without sacrifice of fighting efficiency. By substituting 22-ton guns or some intermediate calibre for 67-ton guns, a considerable reduction of dimensions may be possible in ships resembling in their leading features existing types. We may further reduce dimensions if we abandon the attempt to concentrate all the weapons of the Navy in single ships, and adopt the principle of specialisation.

The armoured ram.

The armoured ram is a type strongly advocated by officers experienced in war. It is at present represented in the British Navy by the solitary Polyphemus, now absent in the Mediterranean. The construction of a single ship does not give adequate representation in the great Navy of England to any type admitted to be of value. Torpedo-rams should be large enough to carry armour for the protection of the vitals. The coal endurance and sea-keeping qualities should be sufficient for cruising in company with a fleet. In the first

series of the naval manœuvres, which, so much to the advantage of the service, have become annual exercises, in the operations on the coast of Ireland under the direction of Sir Geoffrey Hornby, the eyes of all were fixed on the Polyphemus. Captain Jeffreys' charge on the boom at Berehaven will be long remembered as a masterly display of seamanlike skill. If the Polyphemus had remained in home waters it is not improbable that improved vessels of her class would have been laid down. Away in the Mediterranean the Polyphemus has commanded less attention.

The Polyphemus of the future.

In the Polyphemus of the future the freeboard should be increased by building up the light unarmoured top sides to a sufficient height above the armoured deck, doing away with the cumbersome flying deck, the ventilators and raised combings of the original model. The armour should be of sufficient thickness to exclude explosive shells from vital parts.

Swift armoured torpedo-rams, working in groups, would be capable of delivering a combined and most formidable attack on heavier ships.

Lord Armstrong.

"I entirely disbelieve," says Lord Armstrong, "in the power of a battle-ship to prevent a surrounding force of cruisers from closing upon her with ram and torpedo. The difficulty of hitting a rapidly-advancing object, the range of which varies at every instant, is enormous, especially with great guns."

How smaller ships might be built.

We may reduce dimensions by building ships armed with a single turret, and with the armour so distributed as to give in the end on position a protection not inferior to that of the first-class battle-ship. The plan will be more costly than that of carrying a pair of turrets in one ship. The two rams against one ram, the two captains against one captain, and a wider distribution of the great risks of battle, will be compensating advantages.

Assuming that the naval actions of the future will be fought in the manner so often described by French writers—viz. by a series of charges delivered by the opposing ships—it is evident that the offensive powers of the double-turreted ship in the end on position will be greatly strengthened by the support of such auxiliary single-turret ships as have been described, coming up on either quarter. They will deliver right ahead the fire of four additional heavy guns, and threaten with the ram an enemy's ship which should attempt to turn his stern upon their own leader.

Coast defence.

Following up the policy of reducing dimensions by specialisation of types, we may build special types for channel, and for harbour and coast defence. The Ajax and Agamemnon were originally designed

for Channel defence, as were the four vessels of the Cyclops class. The idea was sound, and it should have been followed up by building at least ten ships for the special service for which the original pair of ships were intended.

Our shipbuilding for coast defence should be based on the settled principle that a sufficient force should always be kept in hand to hold the command of the Channel and its approaches. We have numerous ships of the older types available for this service. To the older ships we should add a considerable reinforcement of similar but improved types. It would be a waste of resources to build first-class battle-ships for a limited sphere of operations. In the Channel, ships of a less costly type may be accepted, inferior in coal endurance and sea-keeping qualities. The French are building four ships for coast defence of the Tréhouart type, which may be described as an improved Furieux

Monitors.

The American writers are unshaken advocates of the Monitor. They think that the Monitor, in its simplicity of construction, and the small mark offered to the enemy, combines elements of fighting efficiency in a degree not found in later and much larger vessels. The Monitor was found absolutely effective for the work it was designed to do. It combined the maximum of offence with the minimum of vulnerability. Monitors should be added to the British fleet for harboar, coast, and Channel defence.

Ships for general service.

We have now to consider the best type of ironclad for general service. Every design must be a compromise. At all points we must accept something inferior to the ideal standard of perfection. For naval warfare in the narrow seas, and in European waters, the construction has been recommended of vessels of special types, including improved Polyphemuses, single-turret vessels of high free-board, and Monitors of low free-board. In these special types fighting efficiency in battle has been the primary consideration.

In ships for general service, the conditions must be kept in view which are necessary to give what has been called by the French writers habitability during long service at sea. In peace we have little experience of the demands which in war would certainly be made upon men's power of endurance. An ample free-board is a necessity; it has always received consideration in the French designs; its importance has been under-estimated in the English. In the letters on the ships assembled at Spithead for inspection by the German emperor, from which extracts have already been borrowed, the disadvantages of a low free-board, so conspicuous in many of our ships, were specially insisted upon.

Devastation. The Devastation, completed in 1873, is a powerful fighting ship. In the weight and the disposition of the armament, the completeness of the protection, and in the coal endurance of 5980 knots, she exhibits a decided advance. The new type of sea-going turret-ships, when first introduced, was a bold experiment, and the occasion of much controversy. It is satisfactory that in our first venture we achieved a large measure of success. Deficiency of freeboard forward is the fault of the Devastation; in a seagoing ship it is a grave fault. Men could not endure for weeks to be kept down under hatches. It would be difficult, probably impracticable, with such a form of bow to maintain a high rate of steaming against heavy seas.

Sans Pareil and Victoria, Conqueror and Hero, Hotspur and Rupert. As the Sans Pareil and Victoria may be regarded as a development of the Hero and Conqueror, so the latter may be regarded as a development from the Rupert and Hotspur. In the Hero and Conqueror, both of which were present at Spithead, the measured mile speed is 15·5 knots. Their coal endurance is 5200 knots. Their main armament consists of two 45-ton guns in a turret protected by 12-in. armour. Their minor armament is highly effective. Against these points of excellence we must set the defects—the want of height above water forward, the want of a heavy gun astern, the want of protection for the light guns in the bulky superstructure.

Height of freeboard in French and English ships. It is interesting to compare the marked differences between the French and English designs in relation to the height of side. Amidships the unprotected upper works of the French ships are probably less suitable for a battleship than the compact and well-armoured citadels and batteries of our Dreadnought, Trafalgar, and the still more formidable battleships of Mr. White's design. On the other hand, it must conduce to seaworthiness, habitability, and the maintenance of speed to adopt a bow as in the Amiral Duperré rather than the bow as we have it in the Devastation, the Hero, or even the Admiral class. The bows of the English ships have been kept low to enable the guns mounted in the forward turret to command an all-round fire. In deference to gunnery exigencies considerations of seaworthiness have not been fully regarded. The high French bow involves a corresponding change in the mounting of the heavy guns forward. Instead of being carried in pairs in a single turret, they may be disposed, as in the Amiral Duperré, and the smaller, or Duguesclin type, singly, in two turrets, on sponsons. They may be carried, as in the Dupuy de Lôme, on either bow, under cover of the turtle-back. In either plan an armoured bulkhead across the fore-end of the ship is essential. The French bows, the British type of hull amidships

and aft, would seem a compromise, embracing the best features of both systems.

Protection. We turn next to the method of protection, and here we have to consider protection from attack above the water-line by the gun, and below the water-line by the torpedo and the ram. Below the water-line protection will be best attained by building ships with triple bottoms. At the water-line armour should be carried round the ship of sufficient thickness to keep out light explosive shells. For a distance of several feet inwards from the outer skin the compartments should be filled with woodite, or similar light material. In other words, the system of protection recommended is that proposed by Admirals Ryder and Elliot in their separate report as members of Lord Dufferin's Committee, and now approved, by a happy concurrence of opinion, by Sir Edward Reed and Sir Nathaniel Barnaby. On the upper works it will be essential to give, as far as possible, to men stationed at guns protection from instant and wholesale annihilation by melinite shells. This protection can be given by comparatively thin armour. In our latest battle-ships a thickness of five inches has been accepted as sufficient.

Triple bottoms.

Woodite.

All-round fire from heavy guns in cruising ships. In a cruising fighting ship it will be necessary to carry a sufficient number of heavy guns to secure an effective all-round fire. The lighter guns and the quick-firers should be as numerous as possible. This brings us to a consideration of the limit of dimensions. Any limit must be arbitrary, and yet, in discussing the subject, as here, academically, some line must be drawn. The compiler would hazard an opinion that 10,000 tons is the full development which should be permitted. It gives the constructor 1600 tons in excess of the displacement of the Warspite and the Impérieuse.

Warspite class. Many highly desirable features are combined in the Warspite which are wanting in more costly vessels. The Warspite and the Impérieuse are conspicuous above their contemporaries as affording the necessary conditions for a wholesome life at sea. In the Warspite we find, not only abundance of air and space below, but an ample area on the upper deck for drill and exercise. The Warspite has a measured-mile speed of 16·75 knots, and retains that speed at sea more nearly than the majority of our ships of a high measured-mile speed. The coal endurance is 7000 knots at 10 knots. The four 22-ton guns are carried in heavily-armoured positions.

In a former number of the *Annual*, improvements were suggested in the disposition of armour, with the view to give a complete protection to the battery from melinite shells. In an improved Warspite the protected surface would be larger, the speed would be

increased, the armament would be strengthened, especially in 6-in. and Q.F. guns.

Design described in *St. James's Gazette*.

The leading features of the Warspite bear a close resemblance to the design published in the *St. James's Gazette* of the 6th December, 1889, to the excellence of which, no less than to the cogency of the arguments by which the design was recommended, the compiler ventures to offer, for what it is worth, the testimony of his approval.

In the *St. James's Gazette* a continuous armoured belt is proposed at the water-line, and the armament is carried, not in turrets, but on the broadside. Guns as heavy as can be worked by manual power might be carried at the four angles of the armoured citadel, two in recessed ports behind an armoured bow-screen, and two in recessed ports behind an armoured stern-screen. Two additional armour-piercing guns might be carried within the armoured citadel, mounted, as in the Warspite, on projecting sponsons amidships. The armour of the citadel should be as thick as the constructors could allow without going beyond the assigned limit of dimensions. The coal supply should be as in the Warspite: the speed 19 knots.

As a convenient exposition in a practical shape of the advantages to be gained by building ships of moderate dimensions, the following tables are given, showing approximately the equivalent of the tonnage of first-class battle-ships now in course of construction, expressed in various combinations or groups of ships of the smaller types:—

Groups which could be built for the cost of a single battle-ship of 14,000 tons.

I.

Number of Ships.	Type.	Tons.	Aggregate tonnage.
2	Polyphemus (Improved) . . .	2,640 to 3,000	6,000
2	Single-turret ships	4,000	8,000
			14,000

II.

Number of Ships.	Type.	Tons.	Aggregate tonnage.
1	Polyphemus (Improved) . . .	3,000	3,000
2	Single-turret ships	4,000	8,000
3	Sharpshooter	800	2,400
4	Sea-going torpedo-boats . . .	150	600
			14,000

III.

Number of Ships.	Type.	Tons.	Aggregate tonnage.
2	Single-turret ships	4,000	8,000
7	Sharpshooter	800	5,600
2	Sea-going torpedo-boats . . .	200	400
			14,000

IV.

Number of Ships.	Type.	Tons.	Aggregate tonnage.
1	Warspite (Improved)	9,000	9,000
7	Sharpshooter	800	5,600
			14,600

Comparative fighting efficiency of Group IV. and single battle-ship.

Group.		Battle-ship.
Speed	16 to 17 knots	17 knots.
Armament	4–22 ton guns	4–67 ton guns
	6–6 inch „	10–6 inch „
	14–4·7 inch „	. . . . . .
	32 Quick-firers	18 quick-firers
Torpedo fighting efficiency	8 ships	1 ship
Commanders	8	1

V.

Number of Ships.	Type.	Tons.	Aggregate tonnage.
2	Belted cruisers (17 knots) . . .	5,600	11,200
1	Medea (17 knots)		3,400
			14,600

VI.

1	Edgar	7350	7,350
1	Belted cruiser	5600	5,600
2	Sharpshooter	800	1,600
			14,550

VII.

2	First-class cruiser	7,350	14,700

VIII.

4	Apollo	3,500	14,000
1	Sea-going torpedo-boat	150	150
			14,150

IX.

3	Monitor (armament, 1–115 tons, 1–48 tons; 1–15 in. dynamite gun; 6 quick-firers. Speed, 16 knots)	4,000	12,000
[24	Torpedo boats (improved Yarrow type	91	2,184
			14,184

COMPARATIVE FIGHTING EFFICIENCY OF GROUP IX. AND SINGLE BATTLE-SHIP.

Group.		Battle-ship.
Armament	3–115 ton	4–67 ton
	3–48 ton	. . . .
	3 dynamite guns	. . . .
	18 quick-firers	18 quick-firers
Torpedo fighting efficiency	27 ships	1 ship
Commanders	27	1

All ships above the size of torpedo-boats to be built with triple bottoms below the water-line, cellular-raft at water-line, armoured battery, and bulkhead at bow and stern. Speed, sixteen to seventeen knots.

Cruisers required in numbers.

Cruisers we shall certainly require in numbers, and of various classes. In the new programme forty-two cruisers are proposed. Looking to the demand which might be made upon the Admiralty for mercantile protection in every part of the globe, and to the imperative necessity of keeping open the approaches to the Channel and to our great ports, our efforts should be concentrated at an early date on the reinforcement of the fleet in cruisers of all effective types.

Lieutenant Staunton, U.S.A., in his official report on the manœuvres of 1888, says truly:—

Lieut. Staunton's report.

"The cruisers, when efficient, were masters of the situation, and the manœuvres showed that a greater number of them would add largely to the naval strength of England. Some of them should have the highest speed, an efficient battery, and some side armour; and these features can be combined only in a vessel of large size. Others, lightly armed and unprotected, but strongly built, with good steaming and sea-going qualities, would find their principal occupation in scouting to collect information, and keep touch of the enemy. The most valuable quality in either class is reliability as to speed and steaming endurance."

M. Weyl on French 3rd class cruisers and torpedo-sloops.

Lieutenant Staunton is of opinion that too much has been sacrificed in the cruisers lately constructed to lightness of hull and machinery. The French construction has been similarly criticised. In his work, *La Marine Militaire*, M. Weyl speaks unfavourably of the French third-class cruisers and torpedo-sloops, in which everything, including armament, has been sacrificed for speed; hulls and engines being deficient in the solidity and strength which cannot be given without weight of material. M. Weyl urges that strength of hull, speed, protection, and armament, must be combined to make an efficient cruiser, and that this combination cannot be had in vessels of less than the 4000 or 4500 tons displacement of the modified Dupuy de Lôme (Chanzy type) now in construction for the French Navy.

The English 2nd class cruisers and small vessels

The expenditure on the second-class cruisers, and the small vessels is carried very far in the Admiralty programme. To the numerous small craft inherited from the former Board of Admiralty, there will be added in the period between the 1st of April, 1889, and the 1st of April, 1894, nine gunboats—displacement, 805 tons;

measured mile speed, 13·5 knots; cost, £38,000. Two sloops—displacement, 1170 tons; speed, 14·5 knots; cost, £58,000 each. Eight third-class protected-cruisers, 1582 tons, 16·5 knots, cost, £77,000 each; and forty-one second-class protected cruisers, 2800 to 3400 tons, cost, £150,000 each for the smaller, and £200,000 each for the larger types. The cruisers of the first-class are only eleven in number. The smaller types included in the Admiralty programme will be scouts, or the eyes of the fleet.

Cruisers for distant seas.

For the protection of commerce in distant seas, we need more vessels, with the best qualities that can be given upon a displacement of 5000 tons.

Committee on the Naval Manœuvres of 1888.

The Committee on the manœuvres of 1888 insisted that in the construction of Her Majesty's ships a special effort should be made to ensure their having superiority of speed over the vessels of a similar class of all other maritime powers. Nineteen to twenty knots is aimed at in all the new cruisers. If the Medea class or the improved Medeas could steam 19 knots at sea, no justification could be found for going beyond their displacement. Thus far, however, the smaller vessels have shown a lamentable falling off in speed at sea from that obtained at the forced draught trial on the measured mile. The larger the vessels the higher their speed relatively under the practical conditions of service.

Reduction of the sail power.

The reduction of sail to a mere jury-rig, even in the cruiser-class, is a feature of our most recent shipbuilding which seamen will regret. Lovers of sailing have not yet forgotten the magnificent performances under canvas of the fine clippers of twenty years ago. The Thermopylæ made the passage from London to Melbourne in sixty days, from New South Wales to China in twenty-eight days, and returned from China to London in ninety-two days. The Ariel, Taeping, and Serica left Foochow on the same day, and were docked in London within a few hours of each other, the passage having been made in ninety-nine days. At a time when the British Navy is passing through the phase of determined reaction from the excess to which masting was formerly carried; it is interesting to note that the lead in the development of sailing-ships is at this moment being taken by the house of A. Bordes, of Bordeaux. Their latest ship, a five-masted barque-rigged vessel, carries 5000 tons. In our recent ships the reduction of sail has been carried too far.

The clippers of twenty years ago.

The Calypso.

The Calypso, as a sister ship to the Calliope, was one of the most interesting vessels at Spithead. Her serviceable rig, sufficient for all ordinary cruising-purposes of a man-of-war, and her ample freeboard —qualities of which it would be difficult to exaggerate the im-

portance, both for safety and for the health and comfort of crews at sea—suggested many reflections. The surrounding fleet of cruisers were practically mastless, and dependent therefore wholly upon a not too generous supply of coal. In such vessels the conditions of life for the crews are much inferior to those which existed in the older days of full-rigged ships and constant health-giving physical exercise alow and aloft. In the modern types, if there is plenty of occupation, the want of exercise would tell on the physical condition of the crews in a prolonged service at sea. A light rig would be useful for many purposes. It would not perphaps affect prejudicially the rate of speed under steam. The spars did not prevent the Calliope from steaming past the reefs of Samoa to the open sea beyond. With a suitable rig the saving in coal would be considerable during a long cruise at sea, and in a cruiser every improvement in coal endurance adds materially to efficiency.

Light rig useful for many purposes.

Celerity in coaling is an operation, at least as essential to efficiency in a modern fleet as was smartness in making and taking in sail in the fleets of the older day. The arrangement of bunkers has not been sufficiently considered with reference to the facilities for taking coal on board. In the manœuvres of 1889, the quantity of coal taken on board per hour did not exceed forty tons in the smartest ships. In the ships of the Mediterranean squadrons, better organised, because longer in commission, the rate was considerably higher. At Port Mahon, an average of 79 tons per hour was reached in the Colossus, and 52 tons in the Edinburgh.

Celerity in coaling.

Efficient coal-delivering appliances on board the vessels in attendance on the fleet are not less necessary than an improvement in the other fittings of our vessels of war. The Agincourt in Plymouth Sound took on board from two coal hulks fitted with steam gear and all needful appliances 500 tons in twelve hours.

Coaling efficiency should be improved.

To conclude. The country may wisely rest content with the ship-building programme now in hand. It has been prepared under the advice of the most competent authorities.

Conclusion.

When the work in progress is completed, it will be for the Government of the day to turn their attention to the task of completing our preparations for the naval defence of the empire. The compiler has recommended :—

Summary of recommendation.

(i.) Armoured torpedo-rams and armoured gun-carrying vessels.

(ii.) Improved designs of the Warspite type, armoured against melinite shells.

Both these classes will be serviceable, whether in the fighting line or for the defence of commerce.

(iii.) Monitors, for coast defence.

(iv.) Cruisers.

Class (*a.*) should have great coal endurance for cruising in distant parts of the ocean. Class (*b.*) should be of less tonnage. These would do the scouting for the fleet, and would support the heavy ships as skirmishers. The Piemonte is a representative of this important class.

(v.) Sharpshooters, in larger number than have yet been proposed, are required.

CHAPTER XV.

The Position of England as a Naval Power.

In a concluding chapter it may be convenient to make a general survey of the varied topics discussed in the preceding pages. And first we may consider the leading features in the policy of the existing Board of Admiralty. On more than one occasion Lord George Hamilton has placed the policy of the present administration before the country on the lines which he traced in his speech at Liverpool in November last. General survey.

"They had three objects in view. They wished, first, to raise the standard of the Navy to the proper strength at which it could be permanently maintained, and no one could pretend to say that if its fighting power should be equal to that of any two nations in combination it was an excessive standard. That was the standard which was fixed in the Naval Defence Act and which by Act of Parliament was practically laid down to be the future standard of strength of the Imperial Navy of this country. They associated with that standard a procedure by which, when once the nation through the voice of its elected representatives had given expression to the opinion that such was to be the standard of strength, it should not be in the power of any subsequent Government by covert or underhand action to prevent that resolution from being carried into effect. That to which the Admiralty attached, perhaps, even more importance than the standard of strength or the procedure was the annual test by which should be laid before the nation in clear and unmistakable evidence the progress that year by year was being made towards attaining that standard, and that test was the annual manœuvres, which for the last three years had taken place. The great object of these naval manœuvres was to apply, so far as peace would allow, a practical test to the efficiency of the Navy. If they ever had the misfortune of becoming engaged in a naval war with a great naval power, a great deal would depend upon what they could do at the outset of war, and it was no exaggeration to say that in proportion as they could Admiralty had three objects in view.

improve the organisation of the Navy and increase its preparedness for war, they would augment the fighting efficiency and strength of the Navy."

Mr. Forwood's speech at Blackpool.

In a recent speech at Blackpool, Mr. Forwood, the able secretary to the Admiralty, gave an imposing statement of the recent and prospective reinforcement of the fleet. The ships completed between 1886 and 1891 would include 21 ironclads, 21 protected cruisers, and 56 smaller vessels. To this powerful fleet they would by 1894 add further 8 first-class battle-ships, 2 second-class battle-ships, 9 protected cruisers (first-class), 33 protected cruisers, (second-class), and 18 other war vessels—70 in all, or a total of 161 vessels. During the five years ending March, 1885, £9,000,000 had been expended on new ships. In five years ending March, 1890, the sum so expended would have been £15,500,000, and by March, 1894, £16,100,000 would have been provided for the same purpose.

The programme for which the sanction of Parliament was obtained in the last session included 8 first-class battle-ships, displacement 14,150 tons; 2 second-class battle-ships, displacement 9000 tons; 9 first-class protected cruisers, displacement 7350 tons; 20 second-class protected cruisers, displacement 3400 to 3600 tons; 4 smaller vessels, displacement 2000 tons, and 18 torpedo gunboats. The total displacement of the new fleet is 318,000 tons, and the total expenditure on construction and armament, £21,500,000.

In a later speech at Liverpool, Mr. Forwood described the policy of the Admiralty as embodied in the Navy Estimates for 1890–91.

Mr. Forwood's speech at Liverpool.

"The country has to-day before it the naval budget for the forthcoming year, of the department so ably conducted by my noble chief, Lord George Hamilton. It is true there is nothing of a sensational character as regards these estimates. Last year, as you are well aware, Parliament was induced to fix by act a naval programme of shipbuilding extending over a period of five years, and the scheme thus enacted we are busily engaged in carrying into effect. The total expenditure proposed in the new estimates amounts to £13,786,000, or £100,000 more than the sum provided last year. These figures do not, however, by any means indicate the full extent of our naval progress. You will probably remember that besides the vessels we have building in Her Majesty's dockyards, a large fleet is being built under contract, for the cost of which a special fund has been provided. The best gauge of the relative strength of the Navy is the amount of money to be expended upon the construction of new vessels and the number of seamen to be borne on our books. Let me say, then, that we are to spend in the forthcoming year no less a sum

Amount to be spent on new vessels in 1890–91.

than six and a half millions over our new vessels. This includes about £3,600,000 expected to be paid on account of the contract vessels to which I have alluded. What this large sum of six and a half millions ought to produce can be best illustrated by comparing the average annual expenditure in the five years ending 1885, which amounted only to £2,100,000. A word as to the contract vessels. Parliament authorised the construction of vessels to a value of about eight millions of money, and it will interest you to know that

Ships building by contract

although between the date of the preparation of the estimates of the cost of these vessels, on which money clauses of the act were framed, and the date when it was possible to prepare the designs and specifications and invite tenders, an enormous rise had occurred in the cost of shipbuilding in the United Kingdom, yet the difference between our estimates and the amount at which the contracts have been actually closed is within quite a reasonable percentage. It was no light work, as you may assume, to place out with care and judgment in such busy times shipbuilding and engineering work to so large an extent as that required. Some idea of its magnitude may be formed when I mention that within the past twelve months our contracts embrace propelling machinery for thirty-nine vessels, representing an indicated horse-power of 400,000, and costing in the aggregate over £3,000,000. The utmost variation in price at which these engines were placed with different contractors does not amount to 5 per cent. between the highest and the lowest.

Ships laid down.

We have laid down in all eight first-class battleships, each of over 14,000 tons displacement, or equal in bulk to the Umbrias and Teutonics, two second-class battleships, each exceeding 9,000 tons, eight first-class cruisers of between seven and eight thousand tons each, and nineteen cruisers of 3500 tons each. To secure speed in our cruisers has been a paramount object with our constructors, and I am glad, as a steamship owner, to be able to say that, in order to secure the maintenance of that speed without unduly forcing the boilers, a large increase has been made in the proportion which these bear to the engines over that hitherto customary in the Navy. In addition to thus pushing on with the construction of our new fleet, very important improvements are being made in several of our very useful and most serviceable armoured vessels of the older type.

The older ironclads.

They are being re-engined, with the practical result that their steaming efficiency is improved by no less than 50 per cent. Of course, I do not mean that their speed is increased one-half, but that they are capable of proceeding at a higher rate of speed than formerly, and can carry coal for a distance showing an increase of 50 per cent. In my

judgment there is no more essential element in war-vessel construction to be considered than coal endurance.

Maintenance of the standard.

"I am to-night most anxious to impress upon you, and upon those who may read my words, the most important point which ought to guide our naval policy in the future. It is of little use spending money to raise the standard of your naval strength unless the nation is determined to maintain it at the standard so fixed. We shipowners know, to our cost, how fast is the depreciation in value and utility of our ships, and that unless we set aside a sufficient sum of money annually to replace our vessels as they become obsolete or worn out our capital and our trade will gradually sink from under our feet. This wastage applies with even greater force to war vessels; therefore I desire most emphatically to say, that unless the naval administrators of years to come are prepared to expend annually in the construction of new vessels a sum of money that will equal the depreciation on the existing fleet, the country will inevitably have a yearly diminishing safeguard in the form of its naval defence. That sum is very easily ascertainable. It is now shown annually with the Naval Estimates, and looking ahead to the date of the completion of our present programme, I have carefully calculated what will be the annual depreciation upon the fleet that will then be afloat. The total value of the effective fleet afloat on April 1, 1894, will amount to £80,000,000. Included in this value will be vessels that have cost £22,000,000, each exceeding twenty-two years of age. Such vessels we, in our calculations for depreciation, consider are practically written out of the books. We, therefore, shall remain with a fleet that cost £58,000,000 upon which we have to estimate the depreciation. This is calculated at a varying percentage according to the class of vessel and her probable lasting properties. For example, whilst 4 per cent. only is set aside on battle-ships and cruisers, 9 per cent. is put aside for the wastage upon our fragile torpedo-boats. The percentage thus ascertained amounts to £2,600,000 per annum, and I say most distinctly that as we desire to safeguard the shores and commerce and honour of this country, any ministry who should propose to reduce the annual expenditure in the construction of new vessels below the figure of £2,600,000 will be reducing the effective naval defence of the country. As recently determined in the Naval Defence Bill, this is our limit of annual expenditure, and it should be regarded as the normal outlay.

Value of the effective fleet afloat on April 1st, 1894.

Estimates for depreciation.

"An increase in the number of ships means, of course, an increase in the number of permanent men required for the service. I do not suggest that the number of seamen in the permanent ranks of the

fleet should be increased in full proportion to the increased number of vessels, as we must look to the mercantile marine to furnish us with a supply of seamen who, with the assistance of the more highly-trained seamen of the Navy, would form a most valuable auxiliary in the event of war. It may interest you to know that our number of all ranks in the fleet is to be increased by 3400 in the coming year, raising the total number on the books to nearly 69,000. In 1880 the corresponding number was only 59,000. As I have already stated, I look upon the Royal Naval Reserve as an important feature in the naval defence of the country, and I should like to interest the shipowners of Liverpool and the country as much as possible in that service. They can do much by encouraging those who have charge of the outdoor department of their business to give a decided preference to seamen seeking employment in their vessels who may belong to the Royal Naval Reserve. Our present numbers in the Royal Naval Reserve are 19,300, which is 1300 less than the number for which we ask Parliamentary sanction. Firemen or stokers offer in comparatively few numbers. This I attribute to the want of knowledge of the conditions in joining the service. Those who join receive an annual retainer of £5, without being required to do any work or drill. There is one satisfactory feature, however, in connection with the Naval Reserve, and that is the growing desire of the junior officers in the mercantile marine to accept the new scheme of the Admiralty, and, by serving their twelve months on board a man-of-war, so qualify themselves to be officers of the Reserve for the fleet. I am sure that after a year's drill on board a man-of-war, and the experience thus gained of these vessels, these officers will make much more useful and capable men when they rejoin the merchant service. Twenty-two of these officers will in the coming and succeeding years be borne as commissioned officers on various vessels, and so the nucleus is at once formed of a fighting reserve that will yearly grow in numbers. Apart from these there is the ordinary reserve of mercantile marine officers who drill for twenty-eight days every year now numbering over 500, an increase of 250 in five years.

Increased number of ships means increased number of men.

Royal Naval Reserve.

Men.

Stokers.

Officers.

"Great as have been the efforts put forth in recent years to strengthen the Navy, we may ask ourselves whether the programme now in course of execution is adequate to our needs. In the uncertainty as to the future progress of invention, it is not desirable to go beyond our necessities in expenditure on the material of the fleet. Putting aside considerations of a technical character, no statesman can enter with a light heart into the rivalry in war-like

Is the programme adequate.

preparations, which has converted Europe into an armed camp. Nor is anything gained relatively, if an additional expenditure on our own side is promptly followed by a proportionate increase in the preparations of rival powers. Against these arguments for a restricted expenditure on the one hand, we have to set on the other the indisputable proposition that nothing can be more wasteful than half measures, nothing more unsatisfactory than to spend a large sum, and yet stop short of the creation and maintenance of that sufficient strength which will ensure safety. It is a statesman-like course, and in the end conducive to economy to take a decided line. We cannot foretell the dangers to which the Empire may be exposed. We must make our defence secure at all assailable points."

In submitting their proposals to Parliament for an enlarged programme of shipbuilding, the Admiralty justified their appeal on the ground that it should be the policy of Great Britain to maintain a Navy equal to the combined forces of any two powers.

The following extracts from the speech of M. Gerville Réache, by whom the report of the Committee on the Navy Estimates, appointed by the Chamber of Deputies in 1889, was drawn up, will show how far, in the judgment of a competent authority, the Admiralty have succeeded in fulfilling the undertaking which they have given to the country.

M. Gerville Réache's speech.

"Let us," he said, "examine the present composition of our fleet. I take the figures in the aggregate, grouped as simply as possible. France possess ironclads to the value of £8,000,000. We have 19 first-class ironclads, but of these 7 are of wood and could not be reckoned upon for more than four or five years.

"We have 9 ironclads of the second-class, of which 7 are wood. In five or six years these latter will be worn out; then we have 11 armoured coast-defence vessels, including 5 wooden ships. Thus we possess 19 wooden ships out of 39 ironclads; to these ironclads must be added, it is true, 48 cruisers. Unfortunately half these are of old design, and would have to be laid up in time of war.

"If, on the other hand, we look to the resources of other powers, we find that England has 72 ironclads against our 31. Observe, moreover that these 72 ironclads include 38 first-class ships, with armour of more than 15¾ inches in thickness, and 15 of the second-class, with armour of from 8 to 12 inches. England possesses, in addition, 12 armoured cruisers, and 11 turret-ships for coast-defence."

M. Gerville Réache subsequently proceeded to make a comparison between the fleets of France and those belonging to the powers included in the Triple Alliance.

"France," he said, "has 53 ironclads against 62 for the fleets of the Triple Alliance. Our cruisers number 61, those of the Triple Alliance number 79. We possess 68 sloops, the Triple Alliance has 53 such vessels. Our gunboats number 52, the fleets of the Triple Alliance have 27; but, on the other hand, France has 140 torpedo-boats, the Triple Alliance 282. If we add these various units together, we find that France has 376 ships, as against 503 for the Triple Alliance, or a difference of 127 in favour of the latter. Our inferiority is the greater if you will bear in mind the observation which I made a short time ago, to the effect that we have only an advantage in those ships which must be limited to playing a secondary *rôle* in a European naval war." M. Gerville Réache's comparison of fleets

The net addition to the tonnage of the French Navy in 1888 was 18,000 tons. In 1889 three armoured cruisers, three armoured coast-defence vessels, and a few light ships were laid down. The rate of progress in the construction of ships is roughly as the expenditure. In France the total amount voted in 1887 for the Navy was £8,000,000; the amount taken for new construction, armaments, and works, was £2,960,000. In 1888 the total voted was £7,960,000, of which £2,660,000 was for ships and works. In 1889 the corresponding figures were £8,240,000 and £2,490,000; and in 1890 £8,120,000 and £2,191,600.

The comparative strength of the navies of Europe, in 1894, is thus summed up in an article recently published in the German *Heeres Zeitung*:—

Great Britain . . .	76 ironclads (including 26 coast-defence vessels).
	90 protected ships.
	200 unprotected ships.
	150 torpedo-boats.
Germany	40 ironclads (including 14 of moderate size for coast defence).
	10 protected ships.
	52 unprotected ships.
	150 torpedo-boats.
France	48 ironclads (including 16 coast-defence vessels).
	14 protected ships.
	150 unprotected ships.
	130 torpedo-boats.
Italy	19 ironclads (including 6 coast-defence vessels).
	17 protected ships.
	53 unprotected ships.
	133 torpedo-boats.
Russia	27 ironclads (including 14 for coast defence).
	8 protected ships.
	60 unprotected ships.
	125 torpedo-boats.

In ironclads for the line of battle the British Navy has been brought to a strength which cannot be considered unsatisfactory, but the line-of-battle ships of the great size, which those now under con- Compiler's views.

struction have reached, are only part of the force required for the conduct of naval operations. If the heavy ships possess tremendous powers of offence, they are liable to instant destruction from puny but more agile adversaries. To guard our floating fortresses from such attacks, they must be surrounded in battle by a cloud of auxiliaries. To keep them in touch with the enemy, numerous swift cruisers are required. The manœuvres show that large additions to the Navy List are needed in the classes of cruisers, scouts, and look-out ships.

Ships for the protection of Commerce

For the protection of commerce the class of vessels required must depend on the part of the ocean in which protection is required. In the Mediterranean large tonnage and extreme coal endurance are not necessary. In the Atlantic, in the fine weather latitudes, between the parallels of Gibraltar and St. Helena, the second-class cruisers, of which no less than twenty-four are included in the new programme of construction, would be efficient. In the stormy seas of the Southern Ocean, and on the long stretches between the Cape and the furthest East, where coaling stations are at wide intervals apart, more powerful types are required both for speed and for coal endurance.

At 10 knots the coal endurance of the Blake and the Blenheim is 15,000 knots, of the Australia 8000 knots; Arethusa, 11,000; Mersey, 7400; Archer, 7000; and the gun-vessels of the Curlew type, 950 tons, 10,000 knots. If a marked improvement has been obtained in the smaller vessels of recent types; in cruising or in chase among the long rollers of the Indian Ocean or the Southern Seas, the large ships will never fail to retain their relative superiority. First-class protected cruisers and coast defenders should form the leading features of the next programme of shipbuilding.

British resources.

Turning from the comparative strength in war-vessels to the consideration of those resources upon which the foundation of naval power essentially depends, it is indisputable that Great Britain holds a commanding position. An article by M. Lisbonne, published in *Le Yacht* of 21st December, 1889, gives the following tables (see page 225).

M. Lisbonne calls attention to the relative progress in construction of the different countries. In the last four years the tonnage of Great Britain has increased by 18 per cent., that of Germany by 20, Italy, 46, France, 0·27 per cent. If the highly-subsidised ships of the Messageries Maritimes Company were taken out of account, the total tonnage of France would show, in the interval from 1885 to 1888, a reduction of 27,000 tons, or 4·8 per cent.

LIST OF THE PRINCIPAL MERCANTILE NAVIES IN 1888.

Countries.	Sailing Ships. Number.	Sailing Ships. Net Tonnage.	Sailing Ships. Order.	Steamers. Number.	Steamers. Gross Tonnage.	Steamers. Order.	Total tonnage multiplying that of the steamers by 3.	Order.
Great Britain and Colonies	6,180	3,524,000	1	4,885	6,873,000	1	25,429,000	1
France	920	245,000	8	490	740,000	2	2,466,000	2
Germany	1,292	681,000	4	640	726,000	3	2,862,000	3
United States	3,148	1,402,000	2	425	516,000	4	2,951,000	4
Spain	514	139,000	12	380	399,000	5	1,355,000	5
Italy	1,461	563,000	5	201	284,000	6	1,416,000	6
Netherlands	390	166,000	10	179	191,000	7	737,000	7
Norway	2,929	1,271,000	3	329	185,000	8	1,827,000	8
Sweden	1,029	299,000	6	491	163,000	9	799,000	9
Austria	255	127,000	13	125	149,000	10	575,000	10
Denmark	598	119,000	14	196	110,000	11	539,000	11
Russia	997	278,000	7	220	139,000	12	696,000	12
Japan	150	40,000	15	172	134,000	13	444,000	13
Greece	865	219,000	9	84	72,000	14	535,000	14
Turkey	791	153,000	11	84	64,000	15	345,000	15

NUMBER OF STEAMERS AND TONNAGE FOR THE LAST FOUR YEARS.

Countries.	1885. Number.	1885. Tonnage.	1886. Number.	1886. Tonnage.	1887. Number.	1887. Tonnage.	1888. Number.	1888. Tonnage.	Increase per cent. in 4 years.
Great Britain and Colonies	5,712	6,510,000	5,792	6,596,000	5,715	6,864,000	5,914	7,305,000	11·2
France	508	738,000	509	743,000	481	732,000	490	740,000	0·27
Germany	559	604,000	579	655,000	601	660,000	640	726,000	20·27
United States	378	496,000	400	504,000	398	506,000	425	516,000	4·27
Spain	401	361,000	401	357,000	380	388,000	380	399,000	10·27
Italy	153	195,000	173	230,000	192	266,000	201	284,000	16·27

Facilities for repair.

From the ships we may turn to the facilities for maintenance and repair. From an article published in the last number of the Proceedings of the United States Naval Institute, it appears that of the 616 dry docks in the world, Great Britain and her colonies own 343; the United States, 60; France, 59; Germany, 31; Holland, 18; Spain, 14; Italy and Sweden, 13 each; Belgium, 11;

and Norway, 9. Our conspicuous advantage in the possession of coaling-stations in distant seas has been fully brought out in the chapter on coaling-stations.

Admiral Hamilton.

It has been the received opinion that steam navigation had increased our liability to foreign invasion. Admiral Hamilton maintains that steam, so far from bridging the Channel, has given us the greatest facility for its defence. The first duty of the Navy is to guard Great Britain from invasion; and for this purpose it would be necessary at all times to hold the command of the Channel with an effective force. Sir George Tryon showed, in the manœuvres of last year, that it is not easy to break through the cordon of defence unperceived; should, however, the enemy succeed, in darkness and thick weather, in cutting his way through a fleet stationed at the entrance to the Channel, the news would be promptly communicated, and the British Fleet, turning in hot pursuit, could not fail to come up before any considerable force had been disembarked. The Edinburgh Reviewer has remarked that ten hours were occupied in bombarding Odessa, thirty-six hours in the bombardment of Sveaborg, and ten hours in the bombardment of the forts of Alexandria. In ten hours the force stationed in the Channel would be up with an enemy who might have passed through the line of ships guarding the entrance to the Channel.

The Navy's first duty.

In the first draft of the present chapter, the means of giving protection to commerce, and other questions of naval strategy, were discussed, in the light of recent papers and public statements of leading authorities. On reflection, it has been deemed more consistent to make no reference to topics outside the scope of a volume, dealing chiefly with statistics, and matters of tabulation and record. There is the less occasion for undertaking in the present volume a task which properly belongs to the Naval Intelligence Branch at the Admiralty; because the subject has been fully and ably treated by Sir Charles Dilke. A plan for Naval Campaign had been traced by the compiler on similar lines though perhaps with less lucidity of statement than in the pages of "Problems of Greater Britain."

Having made those extensive preparations for defence, both by sea and land, which a careful examination has shown to be necessary, there is no reason to fear that our country will be unable to face any perils to which we may be exposed. If a strong Navy is essential the surest means of safety will be found in a plain policy of justice, in moderation and magnanimity under provocation, in fidelity to our friends, and in that indissoluble alliance of all English-speaking people, which British statesmen should be foremost to promote.

PART II.

BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

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PART II.

I.

BRITISH ARMOURED AND UNARMOURED SHIPS.

THE list of ships of the British Navy has been compiled from various sources. The official *Navy List* has been the principal guide, and the list is also in accordance with the Navy Estimates for 1890–91. As a rule the displacement and indicated horse-power have been given as stated in the *Navy List*. Wherever possible the column under the heading "speed" has been filled up from reports of actual trial. With respect to the gun and torpedo armament, it is to be noted that, owing to the gradual substitution of breech-loaders for muzzle-loaders at present in progress, to the advance in the power of machine-guns, and to improved methods of ejecting locomotive torpedoes, changes are being continuously made. The columns for "coal-endurance" have been filled, as far as was possible, from the most authentic published reports of the trials of the several ships. Generally the mileage traversible at the speed mentioned has been computed from the quantity of fuel that can be carried in the bunkers. The computations, moreover, have been based upon performances, or estimates of performances, under the most favourable conditions.

The sketches of the ships are all drawn on the same scale (except in a few cases specially indicated), so that their relative sizes are apparent by inspection.

GREAT BRITAIN.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.		Length.		Beam.		Where Built.	Maker of Engines.	Date of Completion.	Cost.		Armour.			Backing.	Armament.		Speed.	Coal Endurance.	
													Hull.	Machinery.	Side.	Bulk-head.	Turret.		Guns.	Fish Torpedo Dischargers.		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
		tons.		ft.	in.	ft.	in.	ft.	in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
br.	**Achilles** (iron)	9820	5720	27	3	380	0	58	3½	Chatham	Penn	1864	375,429	69,117	4½	4½	..	18 to 10	14 9-in. 12-ton M.L.R., 2 6-in. 5-ton B.L.R., 8 Q.F., 14 M., 6 l.	..	14·32	750	2500
t.	**Agamemnon** 2 *s.* (iron)	8660	6360	24	0	280	0	66	0	Chatham	Penn	1883	402,295	101,770	18 & 15	16½ & 13½	16 & 14	18 to 9	4 12½-in. 38-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 6 Q.F., 13 M., 2 l.	2 l. car.	13·25	960	4100
br.	**Agincourt** (iron)	10,690	6870	27	9	400	0	59	5	Birkenh'd	Maudslay	1868	381,700	83,777	5½	4½	..	10	17 9-in. 12-ton M.L.R., 15 M., 14 l.	2 l. car.	14·8	750	1300
t.	**Ajax** (iron) 2 *s.*	8660	6440	24	0	280	0	66	0	Pembroke	Penn	1883	411,622	106,735	18 & 15	16	16	18 to 9	4 12½-in. 38-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 6 Q.F., 13 M., 2 l.	2 l. car.	13·25	960	4100
c.b.	**Alexandra** 2 *s.* (iron)	9490	8610	26	6	325	0	63	8	Chatham	Humphrys	1877	394,263	120,061	12 to 6	8 to 5	..	12 & 10	8 18-ton M.L.R., 4 9·2-in. 22 ton. B.L.R., 6 4-in. 22-cwt. do., 10 Q.F., 15 M., 2 l.	4 l. car.	15·00	680	2700
b.	**Anson** (steel) 2 *s.*	10,600	11,500	27	3	330	0	68	6	Pembroke	Humphrys	1889	*x* and *y* 724,765		18 *comp.*	16 *comp.*	barbette 14 & 12 *comp.*	12 to 15	4 67-ton B.L.R., 6 6-in. 89 cwt. do., 10 Q.F., 7 M., 2 l.	1 f. tu., 4 l. car.	16·75	1200	7100

c.b.	**Audacious** . 2 s. (iron) (Zinc sheathed)	6010	4830	23	8	280	0	51	0	Glasgow	Ravenhill .	1869	193,863	52,619	8 to 6	5	..	10	10 9-in. 12-ton M.L.R., 8 4-in. 22-cwt. B.L.R., 10 Q.F., 5 M., 4 l.	4 l. car.	13·2	500	1260
a.c.	**Aurora** (steel) 2 s.	5600	8500	22	6	300	0	56	0	Pembroke	J. & G. Thomson	1889	x 220,550	y 64,000	10 *comp.*	16 *comp.*	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 89-cwt. B.L.R., 16 Q.F., 7 M., 3 l.	2 l. car.	18·5	900	8000
a.c.	**Australia** . 2 s. (steel)	5600	8500	22	6	300	0	56	0	Glasgow	Napier .	1889	195,390	63,000	10 *comp.*	16 *comp.*	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton B.L.R., 16 Q.F., 7 M., 3 l.	2 l. car.	18·5	900	8000
	Barfleur . .	9000	Second-class Ironclad, design not decided.							Portsm'th	..	..	..	..	..	..	..	..	.. ..	..	17·5	..	..
c.b.	**Belleisle** (iron) 2 s. (was "Payki-Sherreef").	4870	3200	21	0	245	0	52	0	Poplar .	Maudslay .	1878	240,000 (purchased)		12,10, 8,6	9,6,5	9 conning tower.	16 & 9	4 12-in. 25-ton M.L.R., 6 Q.F., 9 M., 2 l.	2 l. car.	12·20	510	1824
c.b.	**Bellerophon** (iron)	7550	6520	26	7	300	0	56	1	Chatham	Penn .	1866	235,738	86,963	6	5	8 pilot tower.	10	10 8-in. 14-ton B.L.R., 4 6-in. 89-cwt. do., 6 4-in. 22-cwt. do., 4 Q.F., 12 M., 4 l.	2 l. car.	14·17	650	1610
b.	**Benbow** (steel) 2 s.	10,600	11,500	28	4	330	0	68	6	Blackwall	Maudslay .	1888	x 650,820	y 110,000	18 *comp.*	16 *comp.*	14 & 12 on barbette *comp.*	12 to 15	2 111-ton B.L.R., 10 6-in. 5 ton do., 15 Q.F., 6 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7100
br.	**Black Prince** . (iron)	9210	5770	26	10	380	2	58	4	Glasgow .	Penn .	1862	283,154	74,482	4½	4½	..	18 to 10	4 8-in. 9-ton M.L.R., 22 7-in. 6½-ton do., 2 6-in. 89-cwt. B.L.R., 4 Q.F., 7 M., 8 l.	2 l. car.	13·60	750	1080
b.	**Camperdown** 2 s. (steel)	10,600	11,500	27	3	330	0	68	6	Portsm'th	Maudslay .	1889	x and y 769,456		18 *comp.*	16 *comp.*	12 to 14 on barbette *comp.*	10 to 15	4 67-ton B.L.R., 6 6-in. 5 ton do., 19 Q.F., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7100
	Centurion . .	9000	Second-class Ironclad, design not decided.							Portsm'th	..	..	..	..	..	..	..	..	.. ..	..	17·5	..	..

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulkhead.	Armour. Turret.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£ x	£ y	in.	in.	in.	in.			knots.	tons.	knots.
b.	**Collingwood** 2 *s.* (steel)	9500	9570	26 10	325 0	68 0	Pembroke	Humphrys	1886	520,000	104,000	18 *comp.*	16 *comp.*	12 to 14 on barbette	17 to 10	4 12-in. 45-ton B.L.R., 6 6-in. 89-cwt. do., 15 Q.F., 11 M., 2 l.	4 l. car.	16·50	1200	8500
t.	**Colossus** (steel) 2 *s.*	9420	7500	26 3	325 0	68 0	Portsm'th	Maudslay .	1886	533,000	113,786	18 & 14	16 & 13	16 & 14 turret.	22 to 10	4 12-in. 45-ton B.L.R., 4 6-in. 5-ton do., 4 Q.F., 15 M., 4 l.	2 l. car.	15·50	970	6200
t.	**Conqueror**. 2 *s.* (steel)	6200	6000	24 0	270 0	58 0	Chatham	Humphrys	1882	325,000	93,433	12 to $8\frac{1}{2}$	$11\frac{1}{2}$ to $10\frac{1}{2}$	12 turret & conning tower.	10 to $13\frac{1}{2}$ on sides, 9 on bulkheads.	2 12-in. 45-ton B.L.R., 4 6-in. 89-cwt. do., 6 Q.F., 12 M., 2 l.	6 l. car.	15·50	650	5200
c.s., *t.*	**Cyclops** (iron) 2 *s.*	3560	1660	16 4	225 0	45 0	Blackwall	Elder .	1871	136,426	17,600	8 & 6	9 & 8 in breastwork.	9 & 10	9 & 11	4 10-in. 18-ton M.L.R, 4 3-pdr. Q.F., 5 M., 1 l.	..	11·0	250	1920
br.	**Defence** (iron) (Non-effective in Navy List)	6270	2540	26 7	280 0	54 2	Jarrow .	Penn .	1862	197,879	34,357	$4\frac{1}{2}$	$4\frac{1}{2}$	..	18	2 9-ton M.L.R., 14 $6\frac{1}{2}$-ton do., 6 M., 4 l.	..	11·62	450	1100
t.	**Devastation** 2 *s.* (iron)	9330	6650	27 6	285 0	62 3	Portsm'th	Penn .	1873	290,660	63,188	12 & 10	12 & 10 breastwork.	14 & 12	18 to 16	4 10-in. 29-ton B.L.R., 14 Q.F., 4 M., 2 l.	2 l. car.	13·84	1800	5980

t.	**Dreadnought** (iron)	2 *s.*	10,820	8210	26	9	320	0	63	10	Pembroke	Humphrys	1875	485,573	107,000	14,12, 11	13	14	18 to 15	4	12½-in. 38-ton M.L.R., 6 Q.F., 16 M., 2 l.	2 f. tu.	14·20	1330	5720
t.	**Edinburgh** . (steel)	2 *s.*	9420	7500	26	3	325	0	68	0	Pembroke	Humphrys	1886	^{x}555,333	^{y}87,000	18 & 14	16 & 13	16 & 14	22 to 10	4	45-ton 12-in. B.L.R., 5 6-in. 5-ton do., 7 Q.F., 13 M., 2 l.	2 l. car.	15·50	970	6200
a.c.	**Galatea** (steel)	2 *s.*	5600	8500	22	6	300	0	56	0	Glasgow .	Napier	1889	^{x}195,390	^{y}63,000	10 *comp.*	16 *comp.*	12 conning tower.	6	2	9·2-in. 24-ton B.L.R., 10 6-in. 5-ton do., 16 Q.F., 7 M., 3 l.	4 l. car.	18·5	900	8000
c.s., t.	**Glatton** (iron)	2 *s.*	4910	2870	19	5	245	0	54	0	Chatham	Laird .	1872	189,133	30,396	12 to 10	12 breast-work.	14 & 12	20 to 15	2	12-in. 25-ton M.L.R., 3 6-pdr. Q.F., 4 M., 2 l.	2 sub. f. tu.	12·11	540	2000
c.s., t.	**Gorgon** (iron)	2 *s.*	3560	1670	16	4	225	0	45	0	Jarrow	Ravenhill	1872	122,904	15,663	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9	4	10-in. 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 2 l.	..	11·14	270	1230
c.s., t.	**Hecate** (iron)	2 *s.*	3560	1750	16	4	225	0	45	0	Poplar	Ravenhill	1872	124,906	15,687	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9	4	10-in. 18-ton M.L.R., 4 3-pdr. Q.F., 4 M., 1 l.	..	10·90	270	1230
br.	**Hector** . (iron)		6710	3260	26	0	280	2	56	5	Glasgow	Napier .	1864	237,438	45,764	4½	4½	..	18	2	8-in. 9-ton M.L.R., 16 7-in. 6½-ton do., 8 M., 5 l.	..	12·36	460	1460
c.b.	**Hercules** (iron)		8680	6750	26	6	325	0	59	0½	Chatham	Penn .	1868	278,320	82,814	9 to 6	6 & 5	..	12 & 10	8	18-ton M.L.R., 2 12½-t. do., 4 7-in. 6½-ton do., 6 4-in. 22-cwt. B.L.R., 7 Q.F., 10 M., 3 l.	4 l. car.	14·00	610	1760
t.	**Hero** (steel)	2 *s.*	6200	6000	24	0	270	0	58	0	Chatham	Rennie .	1887	^{x}338,971	^{y}58,300	12 *comp.*	11½ *comp.*	12 *comp.*	13½	2	12-in. 45-ton B.L.R., 4 6-in. 5-ton do., 12 Q.F., 6 M., 2 l.	6 l. car.	15·5	620	5200
t.	**Hood** (steel)	2 *s.*	14,150	13,000	27	6	380	0	75	0	Chatham	Humphrys	Bldg.	..	..	18 *comp.*	..	..	..	4	67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000

x Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R. breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
c.s., *t.*	**Hotspur** (iron) 2 *s.*	4010	3060	21 10	235 0	50 0	Glasgow	Napier	1871	135,067	36,461	11 & 8	8 breast-work.	10 & 8½	15 to 12 on side 10 on turret.	2 25-ton M.L.R., 2 6-in. 81-cwt. B.L.R., 4 Q.F., 9 M., 2 l.	2 l. car.	12·8	300	920
b.	**Howe** (steel) 2 *s.*	10,300	11,500	27 3	325 0	68 0	Pembroke	Humphrys	1887	^{x}560,469	^{y}106,553	18 *comp.*	16 *comp.*	11½ to 10 on bar-bette.	15 to 12	4 67-ton B.L.R., 6 6-in. 5-ton do., 19 Q.F., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7200
c.s., *t.*	**Hydra** (iron) 2 *s.*	3560	1470	16 4	225 0	45 0	Glasgow	Elder	1872	124,454	16,918	8 & 6	9 & 8 on breastwork.	9 & 10	11 to 9	4 18-ton M.L.R., 4 Q.F., 5 M., 2 l.	..	11·20	250	1920
a.c.	**Immortalité.** (steel) 2 *s.*	5600	8500	22 6	300 0	56 0	Chatham	Earle	1889	^{x}221,500	^{y}57,000 Estd.	10 *comp.*	16 *comp.*	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 89-cwt. do., 16 Q.F., 7 M., 3 l.	2 l. car.	18·50	900	8000
a.c.	**Impérieuse.** (steel) (Copper sheathed.) 2 *s.*	8400	10,000	27 4	315 0	62 0	Portsm'th	Maudslay	1886	^{x}417,437	^{y}113,377	10 *comp.*	9 *comp.*	8 *comp.* on bar-bette.	10	4 9·2-in. 24-ton B.L.R., 6 6-in. 89-cwt. do., 8 Q.F., 9 M., 2 l.	2 f. tu. 4 l. car.	16·75	1130	7000
t.	**Inflexible** (iron) 2 *s.*	11,880	8010	26 4	320 0	75 0	Portsm'th	Elder	1881	648,811	146,457	24, 20, 16	22, 18, 14	17 & 16 *comp.*	17 to 25	4 16-in. 80-ton M.L.R., 8 4-in. 22-cwt. B.L.R., 5 Q.F., 15 M., 2 l.	2 f. tu. sub. 2 l. car.	13·80	1300	5200

c.b.	Invincible (iron)	2 s.	6010	4830	23	2	280	0	54	0	Glasgow	Napier	1870	187,055	52,386	8 to 6		..	10	10 9-in. 12-ton M.L.R., 6 4-in. 22-cwt. B.L., 4 Q.F., 15 M., 4 l.	4 l. car.	14·09	500	1580
c.b.	**Iron Duke** (iron)	2 s.	6010	3520 forced draft & reduced boilers.	23	3	280	0	54	0	Pembroke	Ravenhill	1871	146,314	50,165	8 to 6	5	..	10	10 9-in. 12-ton M.L.R., 4 5-in. 38-cwt. B.L.R., 4 Q.F., 14 M., 8 l.	4 l. car.	13·64	700	3900
br.	**Minotaur** (iron)		10,690	5000	27	3	400	0	59	4¾	Blackwall	Penn	1867	377,325	79,505	5½	4½	..	10	17 9-in. 12-ton M.L.R., 12 Q.F., 6 M., 2 l.	2 l. car.	14·41	750	1200
t.	**Monarch** (iron)		8320	7840	26	7	330	0	57	6	Chatham	Humphrys	1869	279,903	74,672	7 to 6	5 & 4½	10 & 8	12	4 12-in. 25-ton M.L.R., 2 12-ton M.L.R., 1 6½-ton do., 5 Q.F., 15 M., 3 l.	2 l. car.	14·94	630	1500
a.c.	**Narcissus** (steel)	2 s.	5600	8500	22	6	300	0	56	0	Hull	Earle	1889	x 195,890	y 61,500	10 comp.	16 comp.	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton B.L.R., 16 Q.F., 7 M., 3 l.	4 l. car.	18·50	900	8000
a.c.	**Nelson** (iron) (Zinc sheathed.)	2 s.	7630	6640	26	6	280	0	60	0	Glasgow	Elder	1880	303,310	87,545	9 & 6	9,8,6	9 conning tower.	13 to 10	4 18-ton M.L.R., 8 12-ton M.L.R., 4 4·7-in. Q.F., 20 Q.F., 8 M., 3 l.	2 l. car.	14·41	1150	5200
t.	**Neptune** (iron) (Copper sheathed; was "Independencia.")		9310	8000	26	1	300	0	63	0	Poplar	Penn	1878	600,000 (purchased).		12 to 9	8 & 6	11 & 13	11 to 13	4 12½-in. 38-ton M.L.R., 2 9-in. 12-ton M.L.R., 14 Q.F., 10 M., 2 l.	2 l. car.	14·20	670	1480
t.	**Nile** (steel)	2 s.	11,940	12,000	27	6	345	0	73	0	Pembroke	Maudslay	Bldg. Lchd 1888	x 765,794	y 98,000	20 to 16 comp.	18 to 14 comp.	18 comp.	6	4 67-ton B.L.R., 6 4·7-in. Q.F., 8 6-pdr. do., 9 3-pdr. do., 2 l., 4 M.	2 f. tn. 2 l. car.	16·50	1200	6500
a.c.	**Northampton** (iron) (Zinc sheathed.)	2 s.	7630	6070	25	9	280	0	60	0	Glasgow	Penn	1878	296,836	98,968	9 & 6	9,8,6	9 conning tower.	13,10	4 10-in. 18-ton M.L.R., 8 12-ton M.L.R., 18 Q.F. (4 being 4·7-in.), 10 M., 3 l.	2 l. car.	13·20	1150	3850

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun: B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine guns; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
br.	**Northumberland** (iron)	10,780	6560	27 1	400 4	59 5	Millwall	Penn	1868	391,481	79,871	5½	4½	5½ conning tower.	10	7 9-in. 12-ton M.L.R., 20 8-in. 9-ton do., 1 6-in. 89-cwt. B.L.R., 1 5-in. 40-cwt. do., 4 Q.F., 10 M., 12 l.	4 l. car.	14·13	756	1270
c.b.	**Orion** (iron) 2 *s.* (was "Boordji-Zaffer")	4870	4040	21 4	245 0	52 0	Poplar	Maudslay	1882	239,270	52,959	12, 10, 8, 7	9, 6, 5	9 conning tower.	16 & 9	4 12-in. 25-ton M.L.R., 6 Q.F., 8 M., 2 l.	4 l. car.	13·0	520	1830
a.c.	**Orlando** (steel) 2 *s.*	5600	8500	22 6	300 0	56 0	Jarrow	Palmer	1888	*x* 206,647	*y* 60,165	10 *comp.*	16 *comp.*	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 16 Q.F., 7 M., 3 l.	4 l. car.	18·5	900	8000
c.b.	**Penelope** (iron) 2 *s.*	4470	4700	17 6	260 0	50 0	Pembroke	Maudslay	1868	145,993	40,855	6 & 5	4½	..	10 & 11	8 8-in. 9-ton M.L.R., 4 Q.F., 11 M., 4 l.	..	12·76	470	1360
c.s., t.	**Prince Albert** . (iron)	3880	2130	20 4	240 0	48 1	..	Humphrys	1866	178,537	24,129	4½	..	10 & 5½	18	4 9-in. 12-ton M.L.R., 6 M., 2 l.	..	11·65	230	930
b.	**Ramillies** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Glasgow	Thomson	Bldg.	*x* 742,333	*y* 100,160	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000

b.	**Renown** (steel) 2 *s.*	14,150	13,000	27 6	380 0	75 0	Pembroke	Humphrys	Bldg.	..	..	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Repulse** (steel) 2 *s.*	14,150	13,000	27 6	380 0	75 0	Pembroke	Humphrys	Bldg.	..	..	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Resolution** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Jarrow .	Palmer .	Bldg.	^{x}722,322	^{y}90,485	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Revenge** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Jarrow .	Palmer .	Bldg.	^{x}722,322	^{y}90,485	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Rodney** (steel) 2 *s.*	10,300	11,500	27 3	325 0	68 0	Chatham	Humphrys	1887	^{x}563,878	^{y}105,400	18 *comp.*	16 *comp.*	11½ to 10 on bar-bette	15 to 12	1 69-ton B.L.R., 3 67-ton do., 6 6-in. 5-ton do., 14 Q.F., 10 M., 2 l.	4 l. car.	16·75	1200	8500
b.	**Royal Oak** . 2 *s.* (steel)	14,150	13,000	27 6	380 0	75 0	Birkenh'd	Laird .	Bldg.	^{x}746,332	^{y}95,955	18 *comp.*	..		..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
b.	**Royal Sovereign** (steel) 2 *s.*	14,150	13,000	27 6	380 0	75 0	Portsm'th	Humphrys	Bldg.	..	..	18 *comp.*	..	..	..	4 67-ton B.L.R., 10 6-in. Q.F. and 18 other Q.F., 8 M., 2 l.	7 f. tu. or l. car.	17·5	900	5000
c.s., t.	**Rupert** (iron) 2 *s.*	5440	6000	23 7	250 0	53 0	Chatham	Napier	1874	193,171	39,506	11 & 9	12 breast-work.	14 & 12	14 & 10	2 9·2-in. 22-ton B.L.R., 2 6-in. 89-cwt. do., 10 Q.F., 2 M., 2 l.	4 l. car.	13·59	480	1340
t.	**Sans Pareil** . 2 *s.* (steel)	10,470	14,000	27 3	340 0	70 0	Blackwall	Humphrys	1889	^{x}609,109	^{y}110,333	16 to 18 *comp.*	16	18 *comp.*	6	2 111-ton B.L.R., 1 10-in. 29-ton do., 12 6-in. 5-ton do., 21 Q.F., 8 M. 2 l.	4 f. tu. 2 l. car.	16·75	1200	7000

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret-ship; 2 *s.*, two screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns; Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.		Length.		Beam.		Where Built.	Maker of Engines.	Date of Completion.	Cost.		Armour.			Backing.	Armament.		Speed.	Coal Endurance.	
													Hull.	Machinery.	Side.	Bulk-head.	Turret.		Guns.	Fish Torpedo Dischargers.		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
		tons.		ft.	in.	ft.	in.	ft.	in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
c.s., *t.*	**Scorpion** (iron)	2750	1450	16	11	224	6	42	4½	Birkenh'd	Laird	1865	92,033	18,540	4½	..	5	10 to 8	4 9-in. 12-ton M.L.R., 4 3-pdr. Q.F., 6 M., 1 l.	..	10·51	320	1210
a.c.	**Shannon** (iron) (Zinc sheathed.)	5390	3370	23	4	260	0	54	0	Pembroke	Laird	1877	233,902	53,367	9, 8, 6	9 & 8	9 conning tower.	10 & 12	2 10-in. 18-ton M.L.R., 7 9-in. 12-ton do., 10 M., 8 l.	2 l. car.	12·35	580	2260
c.b.	**Sultan** . (iron)	9290	7720	27	6	325	0	59	0½	Chatham	Penn	1871	281,373	76,042	9, 8, 6	6 to 4½	..	12 & 10	8 10-in. 18-ton M.L.R., 4 9-in. 12½-ton M.L.R., 7 4-in. 22-cwt. B.L R., 4 Q.F., 13 M. 11 l.	4 l. car.	14·13	810	2140
c.b.	**Superb** . (iron) (was "Hamidyeh").	9170	8500	26	5	332	3	59	0	Blackwall	Maudslay	1880	443,000 (purchased)		12,10,7	10,7,6 5	8 on conning tower.	7 to 12	16 10-in. 18-ton M.L.R., 6 4-in. 22-cwt. B.L., 16 Q.F., 6 M., 3 l.	4 l. car.	13·50	970	1810
c.b.	**Swiftsure** (iron) (Copper sheathed.)	6910	4910	26	0	280	0	55	0	Jarrow	Maudslay	1872	207,940	49,141	8 to 6	6, 5, 4	..	10	10 9-in. 12-ton M.L.R., 8 4-in. 22-cwt. B.L., 8 Q.F., 11 M., 2 l.	4 l. car.	13·75	540	1630

c.b. & b.	**Temeraire** . 2 *s.* (iron) (Zinc sheathed.)	8540	7520	27	2	285	0	62	0	Chatham	Humphrys	1877	352,015	102,954	11, 10, 9, 8	8—5	10 fore 8 after barbette	12 & 10	4 11-in. 25-ton M.L.R., 4 10-in. 18-ton do., 6 4-in. 22-cwt. B.L.R., 6 Q.F., 13 M., 3 l.	2 l. car.	14·50	620	2680
t.	**Thunderer** . 2 *s.* (iron)	9330	7000	27	0	285	0	62	3	Pembroke	Humphrys	1877	306,084	52,458	12 & 10	12 & 10 breast-work.	14 & 12	18 to 16	4 10-in.[z] 29-ton B.L.R., 14 Q.F., 4 M., 2 l.	2 l. car.	13·40	1600	3040
t.	**Trafalgar** . 2 *s.* (steel)	11,940	12,000	27	6	345	0	73	0	Portsm'th	Humphrys	1887	765,794[x]	97,000[y]	20 to 16 *comp.*	18 to 14 *comp.*	18	6	4 67-ton B.L.R., 8 4·7-in. Q.F., 6 6-pdr. do., 9 3-pdr. do., 2 l. 4 M.	2 f. tu. 2 l. car.	16·50	1200	6500
c.b.	**Triumph** . (iron) (Copper sheathed.)	6640	5110	26	2	280	0	55	0	Jarrow	Maudslay	1873	209,109	49,213	8 to 6	6, 5, 4	..	10	10 9-in. 12-ton M.L.R., 4 5-in. 40-cwt. B.L.R., 16 Q.F., 4 M., 3 l.	4 l. car.	13·75	550	1680
a.c.	**Undaunted** 2 *s.* (steel)	5600	8500	22	6	300	0	56	0	Jarrow	Palmer Co.	1889	195,890[x]	60,165[y]	10 *comp.*	16 *comp.*	12 conning tower.	6	2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 16 Q.F., 7 M., 3 l.	4 l. car.	18·5	900	8000
br.	**Valiant** . (iron) (Harbour Service.)	6710	3350	26	8	280	2	56	4	Poplar	Maudslay	1865	271,964	48,324	4½	4½	..	18	2 8-in. 9-ton. M.L.R, 16 7-in. 6½-ton do., 8 M., 4 l.	..	12·65	450	1430
t.	**Victoria** (steel) 2 *s.* (was "Renown").	10,470	14,000	27	3	340	0	70	0	Newcastle	Humphrys	1889	612,522	112,333	16 to 18 *comp.*	16	18 *comp.*	6	2 111-ton B.L.R., 1 29-ton do., 12 6-in. 5-ton do., 21 Q.F., 8 M., 2 l.	4 f. tu. 2 l. car.	16·75	1200	7000
a.g. b.	**Viper** (iron) 2 *s.* (Coast Defence.)	1230	700	11	8	160	0	32	0	Poplar	Maudslay	1867	43,517	7,610	4½	4½	..	10	2 6½-ton M.L.R., 4 3-pdr. Q.F., 2 l.	..	9·59	110	..
a.g. b.	**Vixen** . . 2 *s.* (Composite.) (Coast Defence.)	1230	740	11	8	160	0	32	5	Deptford Green	Maudslay	1866	46,333	7,860	4½	4½	..	10	2 6½-ton M.L.R., 2 l.	..	8·89	110	..
br.	**Warrior** . (iron)	9210	5270	26	9	380	2	58	4	Blackwall	Penn	1861	282,284	74,409	4½	4½	..	18 to 10	4 8-in. 9-ton M.L.R., 28 7-in. 6½ do., 8 M., 4 l.	..	14·40	790	1210

x Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery. *z* New Main Armament will be 4 10-in. 29-ton B.L.R.

GREAT BRITAIN.—Armoured Ships—*continued.*

a.c., armoured cruiser; ***a.g.b.***, armoured gunbaat; ***b***, barbette ship; ***br.***, brordside ship; ***c.b.***, central-battery ship; ***c.s.***, coast-service vessel; ***t.***, turret-ship; 2 ***s.***, twin-screws.

M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; l., light guns under 15 cwt., including boats' guns: Q.F., quick-firing gun; M., machine gun; *comp.*, compound or steel-faced armour; f. tu., l. car., fixed tube or launching carriage for Whitehead torpedo discharge.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Draught of Water. Extreme.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
a.c.	**Warspite** . 2 *s.* (Copper sheathed.)	8400	10,000	27 4	315 0	62 0	Chatham	Penn	1886	*x* 415,546	*y* 113,786	10 *comp.*	9 *comp.*	8 barbette.	10	4 9·2-in. 22-ton B.L.R., 6 6-in. 89-cwt. do., 8 Q.F., 10 M., 3 l.	2 f. tu. 4 l. car.	16·75	1130	7000
c.s., t.	**Wivern** . (iron)	2750	1450	17 0	224 6	42 4	Birkenh'd	Laird	1865	98,118	18,396	4½	..	5	8 to 10	4 9-in. 12-ton M.L.R., 8 M., 1 l.	..	10·06	300	1150
	The following, which appear in the Official Navy List, belong to India and Australia:—												On breast-work.							
c.s., t.	**Abyssinia***(iron) 2 *s.* (*Indian Marine.*)	2900	950	14 6	225 0	42 0	Poplar	Dudgeon	1870	97,049	19,500	7 & 6	8 & 7 Do.	10 & 8	11 to 9	4 10-in. 18-ton M.L.R., 2 M., 2 l.	..	9·59	92	..
c.s., t.	**Cerberus**† (iron) 2 *s.* (*Colonial Marine.*)	3480	1370	15 3	225 0	45 0	Jarrow	Maudslay	1870	99,331	18,225	8 to 6	9 to 8 Do.	10 & 9	11 to 9	4 10-in. 18-ton M.L.R., 4 M., 2 l.	..	9·75	120	..
c.s. t.	**Magdala**‡ (iron) 2 *s.* (*Indian Marine.*)	3340	1440	15 3	225 0	45 0	Blackwall	Ravenhill	1870	115,400	17,000	8 to 6	9 to 8	10 & 9	11 to 9	4 10-in. 18-ton M.L.R., 2 M., 2 l.	..	10·67	120	..

x Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery.

* At Bombay. † At Melbourne, Va. ‡ At Bombay.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu., fixed torpedo-tube; b. tu., bow do.; l. car., launching torpedo carriage; P., deck protected throughout; pp., deck protected amidships. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Sloop	Acorn	*Comp.*	970	1380	14 0	167 0	32 0	Milford Haven	Maudslay	1884	27,500	14,500	8 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	12·2	150	1900
Cruiser (2nd class)	Active	Iron wood and copper sheathed	3080	4130	21 4	270 0	42 0	Blackwall	Humphrys	1869	85,795	40,361	10 6-in. 81-cwt. B.L.R., 2 64-pdrs. M.L.R., 9 M., 2 l.	2 l. car.	15·10	410	2000
Cruiser P. (2nd class)	Æolus 2 *s.*	Steel	3600	9000	16 6	300 0	43 0	Devonp'rt	..	Bldg.	..	..	2 6-in. B.L., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car.	19·75	400	8000
Desp. Vessel	Alacrity 2 *s.*	Steel	1700	3180	14 0	250 0	32 6	Jarrow	Palmer	1885	x 48,289	y 29,680	4 5-in. 38-cwt. B.L.R., 4 6-pdr. Q.F., 2 M.	..	17·00	400	6450
1st Class Torpedo Gun Boat	Alarm 2 *s.*	Steel	735	..	8 3	230 0	27 0	Sheerness	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. or l. car.	21·0	100	2500
Gun Boat (2nd class)	Albacore	*Comp.*	560	660	10 6	135 0	26 0	Birkenh'd	Laird	1883	18,000	8,500	2 5-in. 38-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	11·0	85	..
Gun Vessel (2nd class)	Algerine	*Comp.*	835	810	13 7	157 0	29 6	Belfast	Laird	1880	25,896	10,556	2 64-pdr. M.L.R., 2 5-in. 40-cwt. B.L.R., 4 M., 1 l.	..	10·50	110	1100
Cruiser pp. (2nd class)	Amphion 2 *s.*	Steel	4300	5550	20 6	300 0	46 0	Pembroke	Maudslay	1883	95,000	65,500	10 6-in. 5-ton B.L.R., 4 Q.F., 12 M., 2 l.	4 l. car.	17·00	1000	11,000
Cruiser P. (2nd class)	Andromache 2 *s.*	Steel	3400	9000	16 6	300 0	43 0	Chatham	Earle	Bldg.	Total. 179,074		2 6-in. Q.F., 6 4·7-in. do., and 9 other do.	4 f. tu. or l. car.	20·0	400	8000

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; **2 *s.***, two screws; **M.L.R.**, muzzle-loading rifled gun; **B.L.R.**, breech-loading rifled gun: **Q.F.**, quick-firing gun; **M.**, machine gun; **l.**, light guns under 15 cwt., including boats' guns; **f. tu.** or **b. tu.**, fixed or bow torpedo tube; **l. car.**, launching torpedo carriage; **P.**, deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Torpedo or 1st class Gun Boat	**Antelope** . 2 *s.*	Steel	735	..	..	..	..	Devonp'rt	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	..	..	..	..
Cruiser . P. (2nd class)	**Apollo** . .	Steel	3400	9000	..	..	43 0	Chatham.	Earle .	Bldg.	Total. 179,059		2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car.	20·0	400	8000
Cruiser . . (3rd class)	**Archer** . 2 *s.*	Steel	1770	3500	14 6	225 0	36 0	Glasgow .	Thomson .	1886	*x* 55,916	*y* 31,667	6 6-in. 5-ton B.L.R., 8 3-pr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·80	475	7000
Cruiser pp. (2nd class)	**Arethusa** . 2 *s.*	Steel	4300	5500	20 6	300 0	46 0	Glasgow .	Napier .	1882	86,763	58,435	10 6-in. 89-cwt. B.L.R., 4 Q.F., 12 M., 2 l.	4 l. car.	17·00	1000	11,000
Cruiser P. (2nd class)	**Astrea** . 2 *s.*	Steel	4200	9000	..	..	..	Devonp'rt	..	Bldg.	..	..	2 6-in. Q.F., 6 4·7-in. do., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car.	19·5	..	..
Gun Vessel .	**Avon** . 2 *s.* (Non-effective)	*Comp.*	603	530	9 7	155 0	25 0	Portsm'th	Maudslay .	1867	16,547	5,797	1 90-cwt. M.L.R., 1 64-pdr. do., 2 20-pdr. do., 2 M.	..	10·34	90	..
Cruiser . . (2nd class)	**Bacchante** .	Iron wood and zinc sheathed	4130	5420	23 9	280 0	45 6	Portsm'th	Rennie .	1876	152,454	76,954	4 6-in. B.L.R., 10 90-cwt. M.L.R., 12 M., 8 l.	2 l. car.	15·06	570	4070
Gun Boat . . (2nd class)	**Banterer** . .	*Comp.*	465	440	10 0	125 0	23 6	Barrow .	..	1880	15,600	5,300	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser . P. (3rd class)	**Barham** . 2 *s.*	Steel	1830	6000	13 3	280 0	35 0	Portsm'th	Hawthorn .	1889	Total. 87,200		6 4·7-in. Q.F., 4 3-pdr. Q.F., 2 M.	2 f. tu. or l. car	19·5	140	2600
" " P.	**Barracouta** 2 *s.*	..	1580	3000	14 0	220 0	35 0	Sheerness	Palmer .	1889	80,000		6 4·7-in. Q.F., 4 3-pdr. Q.F., 2 M.	2 f. tu. or l. car.	16·5	160	3400

Cruiser (3rd class)	P.	Barrosa	2 s.	..	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Portsm'th	[illegible]	[illegible]	[illegible]		[illegible]	[illegible] or l.car	[illegible]	[illegible]	[illegible]
Sloop .	.	**Basilisk** .	2 s.	Steel and wood sheathed	1170	2000	12	6	195	0	28	0	Sheerness	Rennie .	1889	Total. 58,013		8 5-in. 40-cwt., B.L.R., 8 M.	..	14·5	160	3000
" .	.	**Beagle** .	2 s.	Steel and wood sheathed	1170	2000	12	6	195	0	28	0	Portsm'th	Rennie .	1889	Total. 56,474		8 5-in. 40-cwt., B.L.R., 8 M.	..	14·5	160	3000
Cruiser . (3rd class)	P.	**Bellona** .	2 s.	Steel	1830	6000	28	0	35	0	13	3	Newcastle	Hawthorn .	Bldg.	Total. 87,000		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 f. tu. or l.car	19·5	140	2600
Cruiser . (1st class)	P.	**Blake** .	2 s.	Steel	9000	20,000	25	9	375	0	65	0	Chatham .	Maudslay .	1889	Total. 384,520		2 9·2-in. 22-ton B.L.R., 10 6-in. 5-ton do., 16 3-pdr. Q.F., 8 M., 2 l.	4 f. tu. or l.car	22·0	1500	15,000
Cruiser . (3rd class)	P.	**Blanche** .	2 s.	..	1580	3000	14	0	220	0	35	0	Pembroke	Earle .	1889	Total. 80,092		6 4·7-in. Q.F., 4 3-pdr. Q.F., 2 M.	2 f. tu. or l.car	16·5	160	3100
Cruiser . (1st class)	P.	**Blenheim** .	2 s.	Steel	9000	20,000	25	9	375	0	65	0	Thames Ironworks	Humphrys	Bldg.	..	..	2 9·2-in. 22-ton B.L.R., 10 6-in. do., 16 3-pdr. Q.F., 2 M., 2 l.	4 f. tu. or l.car	22·0	1500	15,000
Cruiser . (3rd class)	P.	**Blonde** .	2 s.	..	1580	3000	14	0	220	0	35	0	Pembroke	Earle .	1889	Total. 80,115		6 4·7-in. Q.F., 4-3-pdr. Q.F., 2 M.	2 f. tu. or l.car	16·5	160	3100
Cruiser . (2nd class)	.	**Boadicea** .	.	Iron wood and copper sheathed	4140	5130	23	8	280	0	45	0	Portsm'th	Rennie .	1875	153,167	70,409	2 6-in. 81-cwt. B.L.R., 12 90-cwt. M.L.R., 6 Q.F., 11 M., 2 l.	2 l. car.	14·70	570	3000
" "	P.	**Bonaventure** .	2 s.	Steel	..	..	..		..		..		Devonp'rt	..	Bldg.	..	..	2 6-in. Q.F., 6 4·7-in. do., and 9 other do., 4 M., 1 l.	4 f. tu. or l.car	19·5	..	..
Gun Boat . (1st class)	.	**Bramble** .	2 s.	*Comp.*	715	1000	11	0	165	0	29	0	Belfast .	Harland .	1886	39,835	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
Cruiser . (2nd class)	P.	**Brilliant** .	2 s.	Steel & copper sheathed.	3600	9000	17	6	300	0	43	8	Sheerness	..	Bldg.	..	..	2 6-in. Q.F., 6 4·7 in. do., and 9 other do., 4 M., 1 l.	4 f. tu. or l.car	19·75	400	8000
Cruiser . (3rd class)	.	**Brisk** .	2 s.	Steel	1770	3500	14	3½	225	0	36	0	Glasgow .	Thomson .	1886	55,916	31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	325	4850
Gun Boat . (2nd class)	.	**Bullfrog** .	1 s.	*Comp.*	465	420	9	6	125	0	23	6	Pembroke	Maudslay .	1881	16,300	6,050	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Sloop .	.	**Buzzard** .	2 s.	*Comp.*	1140	2000	11	6	195	0	28	0	Sheerness	Barrow .	1887	x 42,500	y 16,200	8 5-in. 40-cwt. B.L.R. guns, 8 M.	..	14·50	160	3000

x Includes Gun Mountings, &c. y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.								knots.	tons.	knots.
Cruiser . pp. (3rd class)	Calliope . .	Steel wood & copper sheathed	2770	4020	19 11	235 0	4 6	Portsm'th	Rennie .	1884	82,000	38,000	4 6-in. 5-ton B.L.R., 12 5-in. 38-cwt. do., 10 M., 2 l.	2 l. car.	13·75	550	4000
,, ,, ,,	Calypso . .	Steel Do.	2770	3720	19 11	235 0	44 6	Chatham	Rennie .	1883	82,000	37,500	4 6-in. 5-ton B.L.R., 12 5-in. 38-cwt. do., 10 M., 2 l.	2 l. car.	13·75	550	4000
Cruiser . P. (2nd class)	Cambrian. 2 *s.*	Steel Do.	..	..	..	..	..	..	..	Bldg.	..	..	2 6-in. Q.F., 8 4·7-in. do., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·5	..	..
,, ,, ,,	Canada . .	Steel Do.	2380	2430	19 1	225 0	44 6	Portsm'th	Rennie .	1881	78,000 estim'td	26,500 estim'td	10 6-in. 81-cwt. B.L.R., 6 M., 2 l.	2 l. car.	13·00	470	5400
,, ,, ,,	Caroline . .	*Comp.*	1420	1440	15 9	200 0	38 0	Sheerness	Maudslay .	1882	56,000	15,000	14 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	13·10	400	6400
,, ,, ,,	Carysfort . .	Steel wood & copper sheathed	2380	2400	19 3	225 0	44 6	Glasgow .	Elder .	1878	84,512	29,942	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	12·96	470	3840
Cruiser . P. (1st class)	Centaur . 2 *s.*	Steel	7350	12000	23 9	360 0	60 0	Portsm'th	Earle .	Bldg.	..	..	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 16 6-pdr., 3 3-pdr. do, 8 M.	4 f. tu. or l. car	20·00	..	10,000
Cruiser . pp. (3rd class)	Champion. .	Steel wood & copper sheathed.	2380	2340	19 3	225 0	44 6	Glasgow .	Elder .	1878	84,288	29,695	4 6-in. 89-cwt. B.L.R., 8 5-in. 40-cwt. do., 4 3-pdr. Q.F., 6 M., 2 l.	2 l. car.	13·00	470	3840
1st Class Tor-	Circe . . 2 *s.*	Steel	735	4500	8 3	230 0	27 0	Sheerness	..	Bldg.	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu., 2 l. car.	21·0	100	2500

Cruiser . (3rd class)	pp.	**Cleopatra** .		. Steel wood & copper sheathed.	2380	2610	19	3	225	0	44	6	Glasgow .	Humphrys	1878	86,126	27,798	4	6-in. 89-cwt. B.L.R., 8 5-in. 40-cwt. do., 4 3-pdr. Q.F. 6 M., 2 l.	2 l. car.	13·00	470	3280
Gun Boat . (2nd class)	.	**Cockchafer**		. *Comp.*	465	470	9	6	125	0	23	6	Pembroke	Maudslay .	1881	16,000	61,000	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser . (3rd class)	pp.	**Comus** .		. Steel wood & copper sheathed	2380	2450	19	3	225	0	44	6	Glasgow .	Elder .	1878	84,497	29,477	4	6-in. 81-cwt. B.L.R., 8 64-pdr. M.L.R., 8 M., 2 l.	2 l. car.	12·93	470	3800
„ „	pp.	**Conquest** .		. Steel wood & copper sheathed	2380	2670	19	3	225	0	44	6	Glasgow .	Humphrys	1878	83,707	27,205	2	90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·00	470	3280
„ „	„	**Constance.**		. Steel Do.	2380	2590	19	3	225	0	44	6	Chatham .	Penn .	1880	78,000 estim'td	32,000 estim'td	2	90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·72	470	5000
„ „	„	**Cordelia** .		. Steel Do.	2380	2420	19	3	225	0	44	6	Portsm'th	Rennie .	1881	78,000	26,500	10	6-in. 81-cwt. B.L.R., 10 M., 2 l.	2 l. car.	13·00	470	5400
Sloop .	.	**Cormorant**		. *Comp.*	1130	950	15	3	170	0	36	0	Chatham .	Humphrys	1877	37,630	11,587	2	90-cwt. M.L.R., 4 64-cwt., 64-pdr. M.L.R., 4 M., 1 l.	..	11·31	150	1500
Cruiser . (3rd class)	.	**Cossack**	2 s.	Steel	1770	3500	14	3½	225	0	36	0	Glasgow .	Thomson .	1886	x 55,916	y 31,667	6	6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	325	4850
Cruiser . (1st class)	P.	**Crescent** .	2 s.	Steel	7350	12,000	23	9	360	0	60	0	Portsm'th	..	Bldg.	..	..	2	9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 16 6-pdr. do., 3-pdr. do., 8 M., 2 l.	4 f. tu. 3 or l. car	20·00	850	10,000
Cruiser, . (3rd class)	pp.	**Curaçoa** .		. Steel wood & copper sheathed	2380	2540	19	3	225	0	44	6	Glasgow .	Humphrys	1878	85,833	27,098	4	6-in. 5-ton B.L.R., 8 5-in. 40-cwt. do., 1 3-pdr. Q.F., 9 M., 2 l.	2 l. car.	13·00	470	3280
Gun Vessel . (1st class)	.	**Curlew** .	2 s.	Steel	950	1500	10	6	195	0	28	0	Devonp'rt	Penn .	1886	x 37,363	y 12,600	1	6-in. 5-ton B.L.R., 3 5-in. 38-cwt. B.L.R., 7 M.	1 b. tu. 4 l. car.	14·5	250	10,000
Sloop .	.	**Daphne** .	2 s.	*Comp.*	1140	2000	11	6	195	0	28	0	Sheerness	Greenock F'ndry Co.	1888	x 42,400	y 15,200	8	5-inch 40-cwt. B.L.R., 8 M. .	..	14·5	160	..
Surveying Vessel		**Dart** . .		. Wood	470	200	11	6	133	0	25	2	Barrow .	Barrow .	..	Purchased 6,900	..		2 M., 2 l.	..	..	64	..
Sloop .	.	**Dolphin** .		. *Comp.*	925	720	14	0	157	0	32	0	Middl'sbro	Hawthorn .	1882	25,850	9,800	2	6-in. 81-cwt. B.L.R., 2 5-in. 36-cwt. B.L.R., 3 M., 1 l.	..	11·30	135	1700
„ .	.	**Dragon** .		. *Comp.*	1130	1010	15	6	170	0	36	0	Devonp'rt	Maudslay .	1878	36,427	13,069	2	90-cwt. M.L.R., 4 64-pdr. do., 4 M., 1 l.	..	11·52	150	1480

x Includes Gun Mountings, &c. y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo-tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		f. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . P. (1st class)	Edgar . 2 *s.*	Steel	7350	12,000	23 9	360 0	60 0	Devonp'rt	Elder .	Bldg.	..	..	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 16 6-pdr. do., 3 3-pdr. do., 8 M.	4 f. tu. or l.car	20·00	850	10,000
Sloop . .	Egeria (Surveying Service).	*Comp.*	940	1010	14 3	160 0	31 4	Pembroke	Humphrys	1873	32,468	10,414	4 20-pdr. B.L.R., 2 M., 1 l. .	..	11·30	100	1000
Gun Vessel .	Elk . . 2 *s.*	*Comp.*	603	470	8 9	155 0	25 0	Portsm'th	Penn .	1868	16,107	5,775	1 90-cwt. M.L.R., 1 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·25	100	..
Cruiser . . (3rd class)	Emerald . .	*Comp.*	2120	2170	19 0	220 0	40 0	Pembroke	Thomson .	1876	72,312	26,130	4 6-in. 81-cwt. B.L.R., 8 5-in. 38-cwt. do., 7 M., 2 l.	..	13·20	250	2280
Cruiser . P. (1st Class)	Endymion 2 *s.*	Steel	7350	12,000	23 9	360 0	60 0	Hull .	Earle .	Bldg.	228,387	94,113	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr., do., 3 3-pdr. do., 8 M., 2 l.	4 f. tu. or l.car	19·75	850	10,000
Sloop . .	Espiegle . .	*Comp.*	1130	1140	16 3	170 0	36 0	Devonp'rt	Maudslay .	1880	37,000	11,770	10 5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	11·5	150	1480
Gun Boat . (2nd class)	Espoir . .	*Comp.*	465	470	10 0	125 0	23 6	Barrow .	Barrow .	..	..	..	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·8	40	..
Cruiser . (2nd class)	Euryalus . .	Iron wood and zinc sheathed	4140	5110	23 3	280 0	45 6	Chatham.	Easton and Anderson	1877	132,254	76,959	2 6-in. B.L.R., 12 90-cwt. M.L.R., 4 Q.F., 11 M., 3 l.	2 l. car.	14·72	550	2080
Gun Vessel .	Falcon . .	*Comp.*	780	720	13 0	157 0	29 6	Birkenh'd	Laird .	1877	25,763	10,805	1 90-cwt. M.L.R., 2 64-pdr. do., 2 M., 1 l.	..	10·70	120	1990

Cruiser (3rd class)	**Fearless**	2 s.	Steel	1580	3200	14	6	220	0	34	3	Barrow	Barrow	1886	x64,202	23,250	4	5-in. 40-cwt. B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. 4 l. car.	17·27	450	6900
Gun Boat (2nd class)	**Firebrand**		*Comp.*	455	460	10	0	125	0	23	6	Glasgow	Thomson	1877	16,500	6,300	2	5-in. 38-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	10·17	40	..
„ „	**Firefly**		*Comp.*	455	470	10	0	125	0	23	6	Glasgow	Thomson	1877	16,400	6,300	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·99	40	..
„ „	**Firm**		*Comp.*	455	510	10	0	125	0	23	6	Hull	Earle	1877	16,550	6,080	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·2	40	..
Gun Vessel (2nd class)	**Flamingo**		*Comp.*	780	750	12	11	157	0	29	6	Devonp'rt	Elder	1876	25,774	9,228	2	5-in. 38-cwt. B.L.R., 2 64-pdr., 6 M.	..	11·00	130	1170
Gun Boat (2nd class)	**Forester**		*Comp.*	455	480	10	0	125	0	23	6	Earle	Earle	1877	16,500	6,100	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·1	40	..
Cruiser (2nd class)	**Forth**	2 s.	Steel	4050	5700	20	0	300	0	46	0	Pembroke	Hawthorn	1886	151,952	50,000	2	8-inch 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 5 Q.F., 9 M., 2 l.	2 l. car.	18·00	900	8750
Gun Boat (2nd class)	**Forward**		*Comp.*	455	450	10	0	125	0	23	6	Barrow	Hawthorn	1877	14,100	6,400	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·4	40	..
„ „	**Foxhound**		*Comp.*	455	470	10	0	125	0	23	6	Barrow	Hawthorn	1877	14,150	6,550	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·6	40	..
Gun Vessel	**Frolic** (Volunteer Drill Ship.)	s.	*Comp.*	610	900	9	6	155	0	25	0	Chatham	Penn	1872	16,512	6,593	1	90-cwt. M.L.R., 3 64-pdr. do., 2 20-pdr. B.L.R., 2 M.	..	10·70	80	880
Sloop	**Gannet**		*Comp.*	1130	1110	15	9	170	0	36	0	Sheerness	Humphrys	1878	39,581	12,889	2	90-cwt. M.L.R., 3 64-pdr. do., 2 5-in. 38-cwt. B.L.R., 6 M., 1 l.	..	11·53	150	1480
Cruiser (3rd class)	**Garnet**		*Comp.*	2120	2000	19	7	220	0	40	0	Chatham	Hawthorn	1877	64,689	27,779	14	5-in. 40-cwt. B.L.R., 7 M., 2 l.	..	13·00	260	2000
Cruiser (1st class)	**Gibraltar** P.	2 s.	Steel	7350	12,000	23	9	360	0	60	0	Glasgow	Napier	Bldg.	x 215,342	y 97,320	2	9-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 3 3-pdr. do., 8 M., 2 l.	4 f. tu. or l. car	19·5	850	10,000
1st Class Torpedo Gun Boat	**Gleaner**		Steel	735	4500	8	3	230	0	27	0	Sheerness	Sheerness	1890	54,406	Total	2	4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	21·0	100	2500

x Includes Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued*.

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.		Length.		Beam.		Where Built.	Maker of Engines.	Date of Launch.	Cost.		Armament.		Speed.	Coal Endurance.	
														Hull.	Machinery.	Guns.	Fish Torpedo Dischargers		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
			tons.		ft.	in.	ft.	in.	ft.	in.				£	£			knots.	tons.	knots.
Gun Boat . . (1st class)	Goldfinch . .	*Comp.*	805	1200	11	7½	165	0	31	0	Sheerness	Sheerness	1889	40,889	Total	6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Gun Boat . . (2nd class)	Goshawk . .	*Comp.*	430	480	10	0	125	0	22	6	Pembroke	Maudslay .	1872	10,550	3,870	2 6·4-in. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·24	40	..
1st Class Torpedo Gun Boat	Gossamer	Steel	735	4500	8	3	230	0	27	0	Sheerness	Sheerness	1890	54,490	Total	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·0	100	2500
Cruiser . P. (1st class)	Grafton . 2 *s.*	Steel	7350	12,000	23	9	360	0	60	0	Blackwall	Humphrys	Bldg.	*x* 225,107	94,550	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 4 3-pdr. do, 8 M., 2 l.	4 f. tu. or l. car	19·75	850	10,000
Gun Boat . . (2nd class)	Grappler . .	*Comp.*	465	440	10	0	125	0	23	6	Barrow .	Barrow .	1880	15,600	5,250	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 3 M.	..	9·8	..	..
1st Class Torpedo Gun Boat	Grasshopper 2 *s.*	Steel	525	3000	8	9	200	0	23	0	Sheerness	Maudslay	1887	*x* 20,897	*y* 13,168	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
Gun Vessel . (2nd class)	Griffon . .	*Comp.*	780	790	13	2	157	0	29	6	Birkenh'd	Laird .	1876	25,330	10,794	2 5-in. 38-cwt. B.L.R., 2 64-pdr. do., 6 M.	..	10·87	120	1990
Cruiser . P. (1st class)	Hawke . 2 *s.*	Steel	7350	12,000	23	9	360	0	60	0	Chatham .	Elder .	Bldg.	..	..	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F., 12 6-pdr. do., 8 3-pdr. do., 8 M.	..	20·00	850	10,000

Cruiser (1st class) . P.	Hebe .	2 s.	Steel	735	4500	8	8	230	0	27	0	Sheerness	..	..	..	..	2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	21·0	100	2500
Torpedo Depôt Ship.	Hecla .		Iron.	6400	2260	24	3	391	7	38	9	(Purchased) Built and Engined by Harland & Wolff.		1878	126,190		4 64-pdr. M.L.R., 1 5-in. 38-cwt. B.L.R, 1 40-pdr. B.L.R., 14 M.	4 f. tu. or l. car.	11·7	2,200	26,400
Cruiser (3rd class) . pp.	Heroine .		*Comp.*	1420	1130	15	9	200	0	38	0	Devonp'rt	Humphrys .	1881	52,500	14,500	8 6-in. 81-cwt. B.L.R., 4 M., 1 l.	..	13·11	400	6000
Cruiser (3rd class) . pp.	Hyacinth .		*Comp.*	1420	1190	15	9	200	0	38	0	Devonp'rt	Humphrys .	1881	52,500	14,500	8 6-in. 81-cwt. B.L.R. 4 M., 1 l.	..	13·10	400	6000
Sloop .	Icarus .		*Comp.*	970	1230	13	6	167	0	32	0	Devonp'rt	Barrow .	1886	x39,369	y12,735	8 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	12·5	150	2300
Cruiser (2nd class) .	Inconstant .		Iron wood and copper sheathed	5780	7360	25	6	337	4	50	3	Pembroke	Penn .	1868	138,585	74,739	10 9-in. 12-ton M.L.R., 6 7-in. 6½-ton M.L.R., 6 20-pdr. B.L.R., 2 Q.F., 11 M., 2 l.	2 l. car.	16·20	750	2780
„ „ P.	Indefatigable	2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Glasgow .	Rennie .	Bldg.	x 101,875	y 66,057	2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
„ „ „	Intrepid .	2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Glasgow .	Rennie .	Bldg.	x 101,875	y 66,057	2 6-in. 5 ton B.L.R., 6 4·7-in. Q.F., 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
„ „ „	Iphigenia .	2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Glasgow .	Rennie .	Bldg.	x 101,875	y 66,057	2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
„ „ .	Iris . .	2 s.	Steel	3730	7330	22	0	300	0	46	0	Pembroke	Maudslay .	1877	110,868	102,318	13 5-in. 2-ton B.L.R., 4 Q.F., 7 M., 1 l.	4 l. car.	18·0	780	4400
1st Class Torpedo Gun Boat	Jason .	2 s.	Steel	..	..	..		..		..		..	..	..	..	..	2 4·7-in. Q.F., 4 other do. .	..	..	..	..
„ „	Jasseur .	2 s.	Steel	..	..	..		..		..		..	..	..	..	..	2 4·7-in. Q.F., 4 other do. .	..	..	..	..
Sloop .	Kingfisher .		*Comp.*	1130	1090	15	9	170	0	36	0	Sheerness	Maudslay .	1879	39,300	11,850	2 90-cwt. M.L.R., 4 64-pdr. do. 4 M., 1 l.	..	11·60	150	1480
Gun Vessel (1st class) .	Landrail .	2 s.	Steel	950	1500	10	6	195	0	28	0	Devonp'rt	Penn .	1886	37,363	12,600	1 6-in. 5-ton B.L.R., 3 5-in. 38-cwt. B.L.R., 7 M.	1 b. tu. 4 l. car.	14·5	250	10,000

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp., composite hull; 2 *s.* two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun: Q F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns: f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp. partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.								knots.	tons.	knots.
Gun Boat . . (1st class)	Lapwing . .	*Comp.*	805	1200	11 7½	165 0	31 0	Devonp'rt	Devonport	1889	39,952	Total	6 4-in. 25-cwt. B.L.G., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser . P. (2nd class)	Latona . 2 *s.*	Steel	3400	9000	16 6	300 0	63 0	Barrow .	Barrow .	Bldg.	99,795	61,338	2 6-in. 5-ton B.L.R., 6 4·7 in. Q.F., 9 other do., 4 M., 1 l.	4 f. tu. or l. car	20·0	400	8000
Cruiser . pp. (2nd class)	Leander . 2 *s.*	Steel	4300	5500	20 6	300 0	46 0	Glasgow .	Napier .	1882	87,843 estim'td	60,610 estim'td	10 6-in. 5-ton. B.L.R., 4 Q.F., 14 M., 2 l.	4 l. car.	17·00	1000	11,000
1st Class Torpedo Gun Boat	Leda . . 2 *s.*	Steel	735	4500	8 3	230 0	27 0	Sheerness	..	Bldg	..	..	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·0	..	..
Gun Vessel . (2nd class)	Linnet . 2 *s*	*Comp.*	756	1050	10 11	165 0	29 0	Blackwall	Rennie .	1880	25,281	10,382	2 90-cwt. M.L.R., 3 20-pdr. B.L.R., 2 M.	..	11·80	180	2400
Gun Boat . . (1st class)	Lizard . .	*Comp.*	715	1000	11 10	165 0	29 0	Belfast .	Harland .	1887	42,770	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·00	105	2500
Cruiser . P. (2nd class)	Magicienne .	Steel wood and copper sheathed	2950	9000	17 6	265 0	42 0	Glasgow .	Hawthorn	1888	136,000	Total	6 6-in. 5-ton B.L.R., 10 Q.F., 3 M., 1 l.	2 f. tu 4 l. car.	19·75	400	8000
Gun Boat . . (1st class)	Magpie . ——	*Comp.*	805	1200	11 7½	165 0	31 0	Pembroke	Earle .	1889	*x*29,400	*y* 9,300	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	5 10	2500
Cruiser . P. (2nd class)	Marathon .	Steel wood and copper sheathed	2950	9000	17 6	265 0	42 0	Glasgow	Hawthorn	1888	136,000	Total.	6 6-in. 5-ton B.L.R., 10 Q.F., 3 M., 1 l.	2 f. tu. 4 l. car	19·75	400	8000
Sloop	Mariner	Comp.	970	970	14 0	167 0	32 0	Devonp'rt	Hawthorn	1884	37,156	12,841	8 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	11·50	150	2300

Cruiser (2nd class)	P.	**Medea**	2 *s.*	Steel	2800	9000	16	6	265	0	41	0	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6	6-in. 5-ton B.L.R., 10 Q.F., 3 M. 1 l.	2 f. tu. 4 l. car	20·00	400	8000
" "	P.	**Medusa**	2 *s.*	Steel	2800	9000	16	6	265	0	41	0	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6	6-in. 5-ton B.L.R., 10 Q.F., 3 M. 1 l.	2 f. tu. 4 l. car	20·00	400	8000
" "	P.	**Melampus**	2 *s.*	Steel	3400	9000	16	6	300	0	43	0	Barrow	Barrow	Bldg.	99,795	61,338	2	6-in. B.L.R., 6 4·7 in. Q.F., and 9 other do., 4 M., 1 l.	2 f. tu. 4 l. car.	20·0	400	8000
Sloop		**Melita**		*Comp.*	970	1200	13	6	167	0	32	0	Malta	Malta Dock Yard	1888	60,179	Total	8	5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	12·50	150	2100
Cruiser (2nd class)	P.	**Melpomene**	2 *s.* wood and copper sheathed	Steel	2950	9000	17	6	265	0	41	0	Portsm'th	Palmer Co.	1888	*x*92,000	*y*50,000	6	6-in. 5-ton B.L.R., 10 Q.F., 3 M., 1 l.	2 f. tu. 4 l. car	19·75	400	8000
Cruiser (2nd class)		**Mercury**	2 *s.*	Steel	3730	7290	22	0	300	0	46	0	Pembroke	Maudslay	1878	119,452	93,800	13	5-in. 40-cwt. B.L.R., 4 Q.F., 7 M., 1 l.	4 l. car.	18·00	780	4950
Gun Boat (2nd class)		**Merlin**		*Comp.*	430	430	9	6	125	0	22	6	Pembroke	Watt	1871	10,400	3,800	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·5	40	..
Cruiser (2nd class)	P.	**Mersey**	2 *s.*	Steel	4050	6000	19	6	300	0	46	0	Chatham	Humphrys	1885	100,000 estim'td	54,000 estim'td	2	8-in. 15 ton B.L.R., 10 6-in. 5-ton B.L.R., 5 Q.F., 9 M., 2 l.	2 tu. sub 2 l. car.	18·00	900	8750
Sloop		**Miranda**		*Comp.*	1130	1020	15	9	170	0	36	0	Devonp'rt	Napier	1879	37,000	11,700	2	7-in. 90-cwt. M.L.R., 4 64-pdr. do., 4 M., 1 l.	..	11·50	150	1480
Gun Boat (2nd class)		**Misletoe**		*Comp.*	560	650	13	4	135	0	26	0	Birkenh'd	Laird	1883	18,000	8,500	2	5-in. 38-cwt., B.L.R., 2 4-in. 22 cwt. do., 2 M., 2 l.	..	10·7	95	..
Cruiser (3rd class)		**Mohawk**	2 *s.*	Steel	1770	3500	14	6	225	0	36	0	Glasgow	Thomson	1886	*x*55,916	*y*31,667	6	6-in. 5-ton B.L.R., 8 Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
Sloop		**Mutine**		*Comp.*	1130	1120	15	9	170	0	36	0	Devonp'rt	Maudslay	1880	37,500	11,770	10	5-in. 40-cwt. B.L.R., 8 M., 1 l.	..	12·10	150	1480
Cruiser (2nd class)	P.	**Naiad**	2 *s.*	Steel	3400	9000	16	6	300	0	43	0	Barrow	Barrow	Bldg.	99,795	61,338	2	6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 2 l.	4 f. tu. or l. car	20·0	400	8000
1st Class Torpedo Gunboat		**Niger**	2 *s.*	Steel	..	..	..		..	..			..	..	..	..	..	2	4·7-in. Q.F., 4 other do.	..	..	..	..
Sloop		**Nymphe**		*Comp.*	1140	2000	12	6	195	0	28	0	Portsm'th	Greenock F'ndry Co.	1888	*x*42,400	*y*15,200	8	5-in. 40-cwt. B.L.R. 8 M.	..	14·50	160	3000
1st Class Torpedo Gunboat		**Onyx**	2 *s.*	Steel	..	..	..		..	..			..	..	..	..	..	2	4·7-in. Q.F., 4 other do.	..	..	..	..

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y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots:
Cruiser (3rd class)	**Opal**	*Comp.*	2120	2190	18 7	220 0	40 0	Sund'land	Napier	1875	68,574	27,375	12-64-pdr. 64 cwt. M.L.R., 6 M., 2 l.	..	13·4	270	2250
Sloop	**Osprey** (Non-effective)	*Comp.*	1130	1010	15 11	170 0	36 0	Sheerness	Humphrys	1876	39,664	11,674	2 90-cwt. M.L.R., 4 64-pdr. do., 4 M., 1 l.	..	11·5	150	1480
Cruiser (2nd class) P.	**Pallas** 2 *s.*	Steel	2575	7500	15 6	265 0	41 0	Portsm'th	Hawthorn	Bldg.	142,089	Total	8 4·7-in. Q.F., 8 3-in. Q.F., 4 M. 1 l.	1 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class) P.	**Pandora** (Special for Australia) 2 *s.*	Steel	2575	7500	15 6	265 0	41 0	Elswick	Hawthorn	1889	*x*69,381	*y*43,539	8 4·7-in. Q.F., 8 3-in. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (1st class)	**Partridge**	*Comp.*	755	1200	11 4	165 0	30 0	Devonp'rt	Devonport	1888	27,800	10,000	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·25	105	2500
" "	**Peacock**	*Comp.*	755	1200	11 4	165 0	29 0	Pembroke	Barrow Co.	1888	27,600	10,000	6 4-in. 25 cwt. B.L.R., 4 M.	..	13·25	105	2500
Cruiser (2nd class) P.	**Pearl** 2*s.*	Steel	2575	7500	15 6	265 0	41 0	Pembroke	Thomson	Bldg.	141,748	Total	8 4·7-in. Q.F., 8 3-in. Q.F., 4 M. 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Sloop	**Pegasus**	*Comp.*	1130	970	15 9	170 0	36 0	Devonp'rt	Laird	1878	36,697	12,809	2 90-cwt. M.L.R., 4 64-pdr. do., 4 M., 1 l.	..	11·47	150	1750
"	**Pelican**	*Comp.*	1130	1060	15 3	170 0	36 0	Devonp'rt	Humphrys	1877	41,282	14,939	2 6-in. 5-ton B.L.R., 6 5-in. 38-cwt. B.L.R., 4 M., 1 l.	..	12·00	150	1480
Cruiser (2nd class) P.	**Pelorus** (Special for Australia) 2 *s.*	Steel	2575	7500	15 6	265 0	41 0	Elswick	Hawthorn	1889	*x*68,944	*y*43,535	8 4·7-in. Q.F., 8 3-in. Q.F., 4 M., 1 l.	1 f. tu. 2 l. car.	19·0	300	4800
Sloop	**Penguin**	*Comp.*	1130	1110	16 1	170 0	36 0	Glasgow	Hawthorn	1876	39,611	12,500	2 90 cwt. M.L.R., 2 5-in. 38-cwt. B.L.R., 3 64-pdr. M.L.R., 4 M., 1 l.	..	11·00	150	1500

Cruiser, (2nd class)	P.	**Persian** (Special for Australia) 2 s.	Steel	2575	7500	15	6	265	0	41	0	Elswick	Hawthorn	1889	x68,944	y43,535	8 4·7-in. Q.F., 8 3-in. Q.F., 4 M., 1 l.	1 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class)	pp.	**Phaeton** . 2 s.	Steel	4300	5500	20	6	300	0	46	0	Glasgow	Napier	1883	86,763	58,435	10 6-in. 5-ton B.L.R., 16 M., 2 l.	4 l. car.	17·00	1000	11,000
Gun Boat (1st class)	.	**Pheasant** .	*Comp.*	755	1200	11	4	165	0	29	0	Devonpo't	Devonport	1888	x27,800	y10,000	6 4-in. 25 B.L.R., 4 M.	..	13·25	105	2500
Cruiser (2nd class)	P.	**Philomel** .	Steel	2575	7500	15	6	265	0	41	0	Devonpo't	Earle	Bldg.	146,114	Total	8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class)	P.	**Phœbe** . 2 s.	Steel	2575	7500	15	6	265	0	41	0	Devonpo't	Devonport	Bldg.	139,444	Total	8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class)	P.	**Phoenix** (Special for Australia) 2 s.	Steel	2575	7500	15	6	265	0	41	0	Glasgow	Thomson	1889	x76,457	y48,295	8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	1 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (1st class)	.	**Pigeon** .	*Comp.*	755	1200	11	4	165	0	30	0	Pembroke	Barrow	1888	x27,800	y10,000	6 4-in. B.L.R., 4 M.	..	13·25	105	2500
„ „	.	**Pigmy** .	*Comp.*	755	1200	11	4	165	0	30	0	Sheerness	Barrow	1888	28,000	9,700	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·25	105	2500
Cruiser (2nd class)	P.	**Pique** . 2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Jarrow	Palmer	Bldg.	x 106,911	y 64,783	2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
Gun Boat (1st class)	.	**Plover** .	*Comp.*	755	1200	11	4	165	0	30	0	Pembroke	Barrow	1888	28,000	9,700	6 4-in. 25 B.L.R., 4 M.	..	13·25	105	2500
Torpedo Ram,	P.	**Polyphemus** 2 s.	Steel	2640	5520	20	0	240	0	40	0	Chatham	Humphrys	1881	114,000	60,450	6 6-pdr. Q.F., 2 M.	5 f. tu. subm.	17·80	300	3400
Cruiser (3rd class)	.	**Porpoise** 2 s.	Steel	1770	3500	14	6	225	0	36	0	Glasgow	Thomson	1886	x55,916	y31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu.	17·00	475	7000
Cruiser (2nd class)	P.	**Psyche** (Special for Australia) 2 s.	Steel	2575	7500	15	6	265	0	41	0	Glasgow	Thomson	Bldg.	76,435	48,295	8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	1 f. tu. 2 l. car.	19·00	300	4800
Cruiser (3rd class)	pp.	**Pylades** .	*Comp.*	1420	1640	15	9	200	0	38	0	Sheerness	Laird	1884	45,500	16,500	14 5-in. 38-cwt. B.L.R., 8 M., 1 l.	..	13·00	400	6400
Sloop	.	**Racer** .	*Comp.*	970	920	14	0	167	0	32	0	Devonp'rt	Hawthorn	1884	37,000	12,000	8 5-in. 38 cwt. B.L.R., 8 M., 1 l.	..	11·50	150	2300
Cruiser (3rd class)	.	**Racoon** . 2 s.	Steel	1770	4500	13	6	225	0	36	0	Devonp'rt	Harland	1887	x60,606	y31,000	6 6-in. 5-ton B.L.R., 8 Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
Cruiser (2nd class)	P.	**Rainbow** . 2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Jarrow	Palmer	Bldg.	106,911	64,783	2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000

x Includes Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.		Length.		Beam.		Where Built.	Maker of Engines.	Date of Launch.	Cost.		Armament.		Speed.	Coal Endurance.	
														Hull.	Machinery.	Guns.	Fish Torpedo Dis-chargers		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
			tons.		f	in.	ft.	in.	ft.	in.				£	£			knots.	tons.	knots.
Cruiser (2nd class)	Raleigh	Iron wood and copper sheathed	5200	5640	24	7	298	0	49	0	Chatham.	Humphrys.	1873	147,248	46,138	8 90-cwt. M.L.R., 8-6-in. 81-cwt., B.L.R., 8 5-in. 38-cwt. do., 12 M., 4 l.	2 l. car.	15·50	550	2100
Gun Vessel (2nd class)	Rambler (Surveying service).	*Comp.*	835	690	13	7	157	0	29	6	Glasgow	Elder	1880	26,625	10,413	4·20-pdr. B.L.R., 1 M., 1 l.	..	10·66	40	1050
,, ,,	Ranger	*Comp.*	835	760	13	7	157	0	29	6	Glasgow	Elder	1880	26,558	10,710	1 90-cwt. M.L.R., 2 64-pdr. do., 2 M., 1 l.	..	10·95	110	1500
Cruiser pp. (3rd class)	Rapid	*Comp.*	1420	1400	15	9	200	0	38	0	Devonp'rt	Maudslay	1883	52,107	16,119	2 6-in. 81-cwt. B.L.R., 10 5-in. 38-cwt. do., 4 M., 1 l.	..	13·10	400	6000
Gun Boat (1st class)	Rattler	*Comp.*	715	1200	11	0	165	0	29	0	Elswick	Hawthorn.	1886	*x*28,134	*y*10,600	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
1st Class Torpedo Gunboat	Rattlesnake 2 *s.*	Steel	550	2700	8	0	200	0	23	0	Birkenh'd	Laird	1886	*x*21,425	*y*14,000	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	18·5	100	3050
Gun Boat (2nd class)	Raven	*Comp.*	465	380	10	0	125	0	23	6	Poplar	Rennie	1882	14,800	6,250	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·5	40	..
Gun Vessel (2nd class)	Ready 2 *s.*	*Comp.*	610	890	9	10	155	0	25	0	Chatham.	Penn	1872	17,231	6,613	1 7-in. 6½-ton M.L.R., 1 64-pdr. do., 2 20-pdr. B.L.R., 2 M.	..	11·10	80	880
Gun Boat (1st class)	Redbreast.	*Comp.*	805	1200	11	7½	165	0	31	0	Pembroke	Earle	1888	29,400	9,300	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
,, ,,	Redpole	*Comp.*	805	1200	11	7½	165	0	31	0	Pembroke	Earle	1888	29,400	9,300	6 4-in. 25-cwt. B.L.R., 4 M.	..	13·0	105	2500
Gun Boat	Redwing	Tender	461	440	10	0	125	0	23	6	Pembroke	Maudslay	1880	16,400	5,800	2 20-in. B.L.R., 2 M.	..	9·68	40	..

Sloop	**Reindeer**		*Comp.*	970	1030	14	0	167	0	32	0	Devonp'rt	Hawthorn	1883	31,834	52,787	6 5-in. 36-cwt. do., 8 M., 1 l.	..	11·50	150	3200
1st Class Torpedo Gun Boat	**Renard**		Steel	..	..	..		..		..		..	..	..	..	..	2 4·7-in. Q.F., 4 other do.	..	..	..	..
Cruiser P. (2nd class)	**Retribution**	2 s.	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Jarrow	Palmer	Bldg	106,911	64,783	2 6-in. 5-ton B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
Gun Vessel (2nd class)	**Rifleman**	2 s.	*Comp.*	610	710	10	1	155	0	25	0	Chatham	Penn	1872	17,970	6,589	2 90-cwt. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·71	80	880
Gun Boat (1st class)	**Ringdove**		*Comp.*	805	1200	11	7½	165	0	31	5	Devonp'rt	Devonport	1889	39,753	Total	6 4-in. 25 cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser (2nd class)	**Rover**		Iron wood and zinc sheathed	3460	4960	23	0	280	0	43	6	Blackwall	Ravenhill	1874	104,718	65,021	14 6-in. 81-cwt. B.L.R., 8 M., 3 l.	2 l. car.	14·53	410	1840
Cruiser, pp. (3rd class)	**Royalist**		*Comp.*	1420	1510	15	9	200	0	38	0	Devonp'rt	Maudslay	1883	52,134	16·039	2 6-in. 81-cwt. B.L.R., 10 5-in. 38-cwt. do. 4 M., 1 l.	..	13·10	400	6000
Cruiser (3rd class)	**Ruby**		*Comp.*	2120	1830	18	8	220	0	40	0	Hull	Earle	1876	66,113	27,003	12 64-pdr. M.L.R., 6 M., 2 l.	..	12·28	260	2080
Cruiser P. (1st class)	**St. George**	2 s.	Steel & copper sheathed	7700	12,000	23	9	360	0	60	8	Hull	Maudslay	Bldg.	x 250,492	y 95,485	2 9·2-in. 22-ton B.L.R., 10 6-in. Q.F.. 12 6-pdr. do., and 3-pdr. do., 8 M.	4 f. tu. or l. car	19·5	850	10,000
1st Class Torpedo Gun Boat	**Salamander**	2 s.	Steel	735	4500	8	3	..		..		Chatham	Maudslay	1889	37,335	Total	2 4·7-in. Q.F., 4 3-pdr. Q.F.	1 f. tu. 2 l. car.	21·0	100	2500
" "	**Sandfly**	2 s.	Steel	525	3000	8	9	200	0	23	0	Devonp'rt	Maudslay	1887	x22,877	y13,290	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
Cruiser (3rd class)	**Sapphire**		Wood	1970	2360	18	1	220	0	37	0	Devonp'rt	Hawthorn	1874	51,986	26,311	12 64-pdr. M.L.R., 6 M., 2 l.	..	13·58	270	2080
Cruiser P. (2nd class)	**Sappho**		Steel	3400	9000	16	6	300	0	43	0	Poplar	Penn	Bldg.	x96,317	y66,139	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	20·0	400	8000
Cruiser pp. (3rd class)	**Satellite**		*Comp.*	1420	1400	15	9	200	0	38	0	Sheerness	Humphrys	1881	47,500	15,400	8 6-in. 81-cwt. B.L.R., 4 M., 1 l.	..	13·10	400	6000
Cruiser (3rd class)	**Scout**	2 s.	Steel	1580	3200	14	6	220	0	34	0	Glasgow	Thomson	1885	x63,916	y23,600	4 5-in. 40-cwt. B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. 4 l. car.	17·00	450	6900
Cruiser P. (2nd class)	**Scylla**	2 s.	Steel	3400	9000	16	6	300	0	43	0	Poplar	Penn	Bldg.	x96,317	y66,139	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	20 0	400	8000
1st Class Torpedo Gun Boat	**Seagull**	2 s.	Steel	735	4500	8	3	..		..		Chatham	Maudslay	1889	49,000	Total	2 4·7-in. 4 3-pdr. Q.F.	1 f. tu. 2 l. car.	21·0	100	2500

x Includes Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp. composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.		Length.		Beam.		Where Built.	Maker of Engines.	Date of Launch.	Cost.		Armament.		Speed.	Coal Endurance.	
														Hull.	Machinery.	Guns.	Fish Torpedo Dis-chargers		Coals that can be carried in Bunkers.	Distance that can be steamed at 10 knots speed.
			tons.		ft.	in.	ft.	in.	ft.	in.				£	£			knots.	tons.	knots.
Cruiser . . (3rd class)	Serpent . 2 *s.*	Steel	1770	4500	14	6	225	0	36	0	Devonp'rt	Harland .	1887	60,606	31,000 estim'td	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·00	475	7000
Cruiser . P. (2nd class)	Severn . 2 *s.*	Steel	4050	6000	19	6	300	0	46	0	Chatham.	Humphrys.	1885	*x* 151,681	*y* 60,940	2 8-in. 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 5 Q.F., 9 M., 2 l.	1 tu. sub 2 l. car.	18·17	900	8750
Cruiser . . (2nd class)	Shah . . .	Iron wood and copper sheathed	6250	7480	26	5½	334	0	52	0	Portsm'th	Ravenhill .	1873	177,912	57,333	2 9-in. 12-ton M.L.R., 16 7-in. 6½-ton do., 8 5-in. 38-cwt. B.L.R., 4 Q.F., 12 M., 4 l.	2 l. car.	16·20	890	6840
1st Class Torpedo Gun Boat	Sharpshooter . 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Devonp'rt	Bellis .	1888	*x* 29,675	*y* 20,354	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·00	100	2500
" "	Sheldrake. 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Chatham.	Maudslay .	1889	49,000	Total	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·00	100	2500
Cruiser . P. (2nd class)	Sirius . 2 *s.*	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Elswick .	Maudslay .	Bldg.	*x* 107,527	*y* 66,162	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000
1st Class Torpedo Gun Boat	Skipjack . 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Chatham.	Laird .	1889	50,000	Total	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·00	100	2500
" "	Spanker . 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Devonp'rt	Bellis .	1889	50,000	Total	2 4·7-in. Q.F., 4 3-pdr. do. .	1 f. tu. 2 l. car.	21·00	100	2500
Gun Boat . . (1st class)	Sparrow . .	*Comp.*	805	1200	11	7½	165	0	31	0	Greenock	Greenock	1889	39,000	Total	6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Cruiser . P. (2nd class)	Spartan . 2 *s.*	Steel & copper sheathed	3600	9000	17	6	300	0	43	8	Elswick .	Maudslay .	Bldg.	*x* 107,527	*y* 66,162	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	19·75	400	8000

1st Class Torpedo Gunboat	Speedwell. 2 s.	Steel	735	4500	8	3	230	0	27	0	Devonp'rt	Laird .	1889	52,000	Total	2 4·7-in. Q.F., 4 3-pdr. do.	1 f. tu. 2 l. car.	21·00	100	2500
" "	Speedy . 2 s.	Steel	..	..	..	..	..		..		..	..	..	..	..	2 4·7-in. Q.F., 4 other do. .	..	..	..	..
" "	Spider . 2 s.	Steel	525	3000	8	9	200	0	23	0	Devonp'rt	Maudslay	1887	x23,000	y13,300	1 4-in. 25-cwt. B.L.R., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·00	80	2400
Gun Boat . (2nd class)	Starling .	Comp.	465	360	10	0	125	0	23	6	Poplar .	Rennie .	1882	14,850	6,250	2 64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·50	40	..
" "	Stork (Surveying Vessel)	Comp.	465	350	10	0	125	0	23	6	Poplar .	Rennie .	1882	14,900	6,250	2 l., 1 M.	..	9·50	40	..
Despatch Vessel.	Surprise 2 s.	Steel	1650	3030	14	0	250	0	32	6	Jarrow .	Palmer .	1885	x49,084	y29,680	4 5-in. 38-cwt. B.L.R., 4 6-pdr. Q.F., 2 M.	..	17·00	400	6450
Cruiser . (2nd class) P.	Sybille . 2 s.	Steel	3400	9000	16	6	300	0	42	0	Stephensons.	Hawthorn.	Bldg.	x97,587	y66,387	2 6-in. B.L.R., 6 4·7-in. Q.F. and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	20·0	400	8000
Sloop .	Swallow . 2 s.	Comp.	1130	1570	11	6	195	0	28	0	Sheerness	Rennie .	1886	44,797	15,000	8 5-in. 38-cwt. B.L.R., 8 M. .	..	13·50	280	5000
Gun Vessel (2nd class)	Swift. . 2 s.	Comp.	756	1010	10	11	165	0	29	0	Blackwall	Rennie .	1879	24,290	10,380	2 90-cwt. M.L.R., 3 6-pdr. Q.F., 2 M.	..	11·81	180	2400
Gun Boat . (2nd class)	Swinger .	Comp.	430	520	9	6	125	0	22	6	Pembroke	Humphrys	1872	10,600	3,900	2 64-in. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	10·38	40	..
Cruiser . (3rd class)	Tartar . 2 s.	Steel	1770	3500	14	3½	225	0	36	0	Glasgow .	Thomson .	1886	x55,916	y31,667	6 6-in. 5-ton B.L.R., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·33	325	4850
Cruiser . (2nd class) P.	Terpsichore 2 s.	Steel	3400	9000	16	6	300	0	43	0	Glasgow .	Thomson .	Bldg.	x96,307	y66,472	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do.	4 f. tu. or l. car	20·0	400	8000
Corvette . (Troop Ship)	Thalia . (Harbour service)	Wood	2240	1600	18	3	200	0	40	4	Woolwich	Napier .	1869	47,915	21,709	6 64-pdr. M.L.R., 2 M., 2 l. .	..	11·14	230	2350
Cruiser . (2nd class) P.	Thames . 2 s.	Steel	4050	5700	19	6	300	0	46	0	Pembroke	Penn .	1886	151,952	53,500	2 8-in. 15-ton B.L.R., 10 6-in. 5-ton B.L.R., 5 Q.F., 9 M., 2 l.	2 l. car.	18·00	900	8750
Cruiser . (1st class) P.	Theseus . 2 s.	Steel	7350	12,000	23	9	360	0	60	0	Blackwall	Maudslay .	Bldg.	x 226,341	y 92,971	2 9·2-in. 22-ton. B.L.R., 10 6-in. Q.F., 12 6-pdr., and 4 3-pdr. do., 8 M.	4 f. tu. or l. car	19·75	850	10,000

x Includes Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

comp, composite hull; 2 *s.*, two screws; M.L.R., muzzle-loading rifled gun; B.L.R., breech-loading rifled gun; Q.F., quick-firing gun; M., machine gun; l., light guns under 15 cwt., including boats' guns; f. tu. or b. tu., fixed or bow torpedo tube; l. car., launching torpedo carriage; P., deck protected; pp., partial deck protected. The protecting decks in all these cases are at least one inch thick.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Draught of Water.	Length.	Beam.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . P. (2nd class)	**Thetis** . 2 *s.*	Steel	3400	9000	16 6	300 0	43 0	Glasgow .	Thomson .	Bldg.	x96,307	y66,472	2 6-in. B.L.R., 6 4·7-in. Q.F., and 9 other do., 4 M., 1 l.	4 f. tu. or l. car	20·0	400	8000
Gun Boat . . (1st class)	**Thrush** . .	*Comp.*	805	1200	11 7½	165 0	31 0	Greenock	Greenock F'ndry Co.	1889	39,000	Total	6 4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Cruiser . . (3rd class)	**Tourmaline** .	*Comp.*	2120	2000	18 8	220 0	40 0	Middl'sbro	Hawthorn.	1875	69,998	25,771	4 6-in. 89-cwt. B.L.R., 8 5-in. 38-cwt. do., 8 M., 2 l.	..	12·62	280	2000
Cruiser . P. (2nd class)	**Tribune** . 2 *s.*	Steel	3400	9000	16 6	300 0	43 0	Glasgow .	Thomson .	Bldg.	x96,307	y66,472	2 6-in. Q.F., 6 4·7-in. do., and 9 other do.	4 f. tu. or l. car	20·0	400	8000
Cruiser . . (3rd class)	**Turquoise.** .	*Comp.*	2120	1990	19 1	220 0	40 0	Hull .	Earle .	1876	68,089	27,458	12 64-pdr. M.L.R., 9 M., 2 l. .	..	12·32	280	2080
Torpedo Vessel .	**Vesuvius** . 2 *s.*	Iron	245	390	8 6	90 0	22 0	Pembroke	Maudslay .	1874	10,522	7,465	Nil	4 tu.	9·71	25	..
Cruiser . . (2nd class)	**Volage** . .	Iron wood and copper sheathed	3080	4530	22 0	270 0	42 0	Blackwall	Ravenhill .	1874	91,817	41,000	10 6-in. 81-cwt. B.L.R., 2 64-pdr. M.L.R., 9 M., 2 l.	2 l. car.	15·30	420	1850
Torpedo (Depôt Ship). P.	**Vulcan** . 2 *s.*	Steel	6620	12000	23 0	350 0	58 0	Portsm'th	Humphrys	1889	278,163	Total	8 4·7-in. Q.F., 12 3-in. Q.F. .	2 f. tu. 4 l. car.	20·0	1000	12,000
Sloop . .	**Wanderer** .	*Comp.*	925	750	14 0	157 0	32 0	Middl'sbro	Hawthorn.	1883	25,850	9,800	2 6-in. 81-cwt. B.L.R., 2 5-in. 36-cwt. do., 2 M., 1 l.	..	11·80	135	1700

Gunboat (2nd class)	**Watchful**	*Comp.*	560	650	11	6	135	0	26	0	Birkenh'd	Lairds	1883	32,527	Total	2	5-in. 40-cwt. B.L.R., 2 4-in. 22-cwt. do., 2 M.	..	11·0	85	..
Torpedo or 1st class Gunboat	**Whiting** (Special for Australia) 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Elswick	Bellis	1889	*x*26,456	*y*21,205	2	4·7-in. Q.F., 4 3-pdr. do., 1 M.	1 f. tu. 2 l. car.	21·00	100	2500
Gunboat (1st class)	**Widgeon** 2 *s.*	*Comp.*	805	1200	11	7½	165	0	30	0	Pembroke	Rennie	1889	39,315	Total	6	4-in. 25-cwt. B.L.R., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Sloop	**Wild Swan**	*Comp.*	1130	1090	15	10	170	0	36	0	Glasgow	Hawthorn	1876	39,643	11,853	2	6-in. 81-cwt. B.L.R., 6 5-in. 38-cwt. do., 4 M., 1 l.	..	11·35	150	1120
Torpedo or 1st class Gunboat	**Wizard** (Special for Australia) 2 *s.*	Steel	735	4500	8	3	230	0	27	0	Elswick	Bellis	1889	*x*26,456	*y*21,193	2	4·7-in. Q.F., 4 3-pdr. do., 1 M.	1 f. tu. 2 l. car.	21·00	100	2500
Gunboat (2nd class)	**Wrangler**	*Comp.*	465	480	10	6	125	0	28	6	Barrow	Barrow	1880	17,267	5,460	2	64-pdr. M.L.R., 2 20-pdr. B.L.R., 2 M.	..	9·88	40	..

Royal Naval Reserved Merchant Cruisers.

List of Vessels held by the Owners at the disposition of the Lords Commissioners of the Admiralty.

	Name.		Owners.	Length.	Breadth.	Maximum Draught of Water for the Admiralty List.	Gross Tonnage.	Average Ocean Speed.
				Feet.	Feet.	Feet.	Tons.	Knots.
With Subvention.	Etruria		Cunard Company	501·5	57·2	26	7,718	18½
With Subvention.	Umbria		" "	501·5	57·2	26	7,718	18½
With Subvention.	Aurania		" "	470	57·2	26	7,269	16½
With Subvention.	Victoria		Peninsular and Oriental Co.	466	52	22½	6,300	15¼*
With Subvention.	Britannia		" " "	466	52	22½	6,300	15¼*
With Subvention.	Oceana		" " "	466	52	22½	6,300	15¼*
With Subvention.	City of Paris	2 s.	Inman and International Co.	525	63¼	24½	10,500	19
With Subvention.	City of New York	2 s.	" " "	525	63¼	24½	10,500	19
With Subvention.	Majestic	2 s.	White Star Company	565	58	..	10,000	19
With Subvention.	Teutonic	2 s.	" "	565	58	..	10,000	19
	Britannic		" "	455	45·2	25	5,004	15
	Germanic		" "	455	45·2	25	5,008	15
	Adriatic		" "	437·2	40·9	23	3,888	14
	Celtic		" "	437·2	40·9	23	3,867	14
	Servia		Cunard Company	515	52·1	26	7,392	17
	Gallia		" "	430·1	44·6	24	4,809	15
	Arcadia		Peninsular and Oriental Co.	466	52	22½	6,300	15¼*
	Valetta		" " "	420·4	45·1	22½	4,911	15½
	Massilia		" " "	420·4	45·1	22½	4,908	15½
	Rome		" " "	430·1	44·4	22½	5,013	15
	Carthage		" " "	430·1	44·4	22½	5,013	15
	Ballarat		" " "	420·2	43	22½	4,752	14½
	Parramatta		" " "	420·2	43	22½	4,759	14½
	City of Berlin		Inman and International Co.	..	..	..	5,491	..
	City of Chicago		" " "	..	..	..	5,202	..

There are numerous ships on the Admiralty List complying with Admiralty conditions as to subdivision which have no national tie. They are suitable for receiving an armament, but there is no arrangement with Owners, except the promise of preference for occasional State employment.

* Average speed of Britannia between Brindisi and King George's Sound, Western Australia. The average ocean speed is higher than this.

Smaller Vessels, Gunboats.

Smaller Vessels, &c.

Note.—Troop and store ships, yachts, armed tugs, special service and harbour-service vessels, training ships, coast guard vessels, and small surveying vessels are not included.

Paddle-wheel Vessels. — Alecto, Cockatrice, Enchantress (late Helicon), Pioneer, Sphinx, Vigilant, Research.

Old Type Gunboats.—Britomart, Cherub, Orwell, 330 tons; from 218 to 227 I.HP.

Twin Screw Gunboats (Iron).—Dee, Don, Esk, Medina, Medway, Sabrina, Slaney, Spey, Tay, Tees, Trent, Tweed, 363 tons; 320 to 410 I.HP.

Twin Screw Iron or Steel Gunboats (Staunch Type).—Ant, Arrow, Badger, Blazer, Bloodhound, Bonetta, Bouncer, Bulldog, Bustard, Comet, Cuckoo, Fidget, Gadfly, Griper, Hyæna, Insolent, Kite, Mastiff, Pickle, Pike, Pincher, Plucky, Scourge, Snake, Snap, Staunch, Tickler, Weasel, 180 to 254 tons; 130 to 270 I.HP.

Torpedo Boats.

First Class.

19 of about 85 feet in length, 28 tons displacement, and 350 to 500 I.HP., of about 18 to 20 knots speed. Nos. 1–15 and 17–20.

2 of about 100 feet in length, 40 tons displacement, and 350 to 500 I.HP. (at Esquimalt). Nos. 39 and 40.

4 of about 110 to 113 feet in length, 63 to 67 tons displacement, and about 18½ to 20½ knots speed. Nos. 21–24.

48 of about 125 feet in length, 60 to 66 tons displacement, and 750 I.HP., and about 21 knots speed. Nos. 25–33 and 41–79.

5 of about 125 feet in length, 85 tons displacement, and 750 I.HP. Nos. 34–38.

1 of about 135 feet in length (Falke type), 87 tons displacement, and 1320 I.HP. No. 80.

1 of about 150 feet in length (late Swift), 137 tons displacement, and about 1300 I.HP. No. 81.

6 of about 130 feet in length, with a speed of 22½ knots. Nos. 82–87.

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These carry an armament of 3-pdr. quick-firing and machine guns, and three torpedo-launching tubes.

Second Class.

Smaller Vessels, &c.

51 of 60 to 66 feet in length, 12 tons displacement, and of 100 to 140 I.HP.
10 about the same length and of improved type, with a speed of 16 knots.
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TORPEDO BOATS (WOOD).

12 of 56 feet in length, 11 tons displacement, and 150 I.HP.

The following vessels of various classes are noted in the official *Navy List* for January, 1890, as being non-effective for sea service, and mainly for sale:—

	Displacement.	I.HP.	
Actæon (late Vernon)	830 ...	... Sailing	
Algiers (late Anson)	5260 ...	... 3583	
Avon (Gun Vessel)	603 ...	... 530	(to be sold)
Calcutta (Four Decker) ...	3590 ...	... Sailing	(to be sold)
Cherub	330 ...	... 220	(to be sold)
Clinker (Gunboat)	284 ...	60 nom.	(to be sold)
Defence (Armourclad)	6270 ...	... 2540	
Forte (Screw Frigate)	3456 ...	... 1539	(to be sold)
Kent (late Impregnable) ...	3880 ...	... Sailing	(to be sold)
Kingfisher (Screw Sloop) ...	1130 ...	... 1090	(to be sold)
Newcastle (Screw Frigate; lent to War Department)	4020 ...	... 2354	
Orwell (Gunboat)	330 ...	... 228	(to be sold)
Osprey (Sloop)	1130 ...	... 1010	(to be sold)
Rifleman (Gun Vessel) ...	610 ...	... 71	(to be sold)
Valorous (Paddle Frigate) ...	2300 ...	... 1145	(to be sold)
Victoria (3 decker)	6959 ...	... 4191	
Waterwitch (Ironclad Gunboat)	1280 ...	... 730	

Indian Marine.

(The ironclad ships Abyssinia and Magdala, belonging to the Indian Government, are included in the alphabetical list of Armoured Ships of the Royal Navy.)

Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Storage.	Armament.
						ft. in.	ft. in.	ft. in.				tons.	
Troop Ship .	Amberwitch	Iron .	1	Liverpool	1862	175 6	27 0	12 0	1,010	250	7·7	90	
Ditto . . .	Canning, was Golconda	Steel .	1	Glasgow	1882	285 0	36 2	16 8	3,300	1,080	10·6	400	
Ditto . . .	Clive . .	Iron and Steel	1	Birkenhead	1882	300 0	45 6	16 6	3,570	2,300	12·0	500	
Inland Steamer	Comet . .	Steel .	Pad.	..	..	..	..	..	144	190	..	..	Two 1-inch Nordenfelts.
Sailing Ship .	Czarewitch	Composite	..	Sunderland	1866	185 0	32 0	19 6	1,990				
Troop Ship .	Dalhousie .	Steel .	1	Greenock	B'lding.	239 6	36 0	15 7	1,960	1,500	13·0	300	Six 6-pr. Q.F. guns.
Surveying Ship	Investigator	Wood .	Pad.	Bombay	1881	180 0	25 8	11 3	856	660	10·5	105	
Inland Steamer	Irrawaddy	Iron .	Pad.	..	..	..	..	..	..	750	..	..	Two 20-prs. B.L.R.; two 9-prs. R.M.L.
Despatch Vessel	Lawrence .	Steel .	Pad.	Birkenhead	1886	212 2	32 2	18 3	1,154	1,200	13·5	270	Four 4-inch B.L.R.
Tug . . .	Madras .	Wood .	Pad.	Blackwall	1876	123 3	20 7	7 5	197	150 nom.	8·0	100	
Tug . . .	Manora .	Wood .	Pad.	Bombay	1869	141 5	26 0	12 1	420 B.M.	250	9·0	125	
Yacht . . .	May Frere .	Wood .	Pad.	Bombay	1864	168 0	19 7	8 3	450	500	10·0	60	
Guard Ship .	Quangtung	Iron .	Pad.	Birkenhead	1863	185 3	24 7	11 3	900	520	..	160	Six 9-prs. R.M.L.
Inland Steamer	Sir Wm. Peel	Iron .	Pad.	..	..	..	..	..	302	600	..	..	Two 12-pr. Howitzers; four Nordenfelts M.G.
Inland Steamer	Sladen .	Steel .	Pad.	..	..	..	..	..	260	360	..	..	Two 12-pr. Howitzers; four Nordenfelts M.G.
Troop Ship .	Tenasserim	Iron .	1	London	1872	250 0	35 0	18 1	2,570	1,140	11·0	385	
Tug . . .	Undaunted	Iron .	Pad.	Dumbarton	1865	160 0	25 2	11 7	470	1,080	10·0	115	
Torpedo or 1st class Gunboat	New . .	Steel .	2	..	'lding	Sharpshooter type.							
Ditto . . .	New . .	Steel .	2	..	B'lding	Ditto.							

India also possesses seven First Class Torpedo Boats of the newest type. They were built in England, and sent out in 1889.

Colonial Marine (Great Britain).

(The Ironclad Turret-ship Cerberus, belonging to the Victorian Government, the five special second class Cruisers, and the two Torpedo Gunboats of the Sharpshooter class for Australia are included in the alphabetical list of Ships of the Royal Navy.)

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Storage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
Victoria	Old line-of-battle ship	Nelson	Wood	1	Portsmouth	Converted 1860	216 3	54 6	..	4,096	2,102	10·0	..	Two 7-in. M.L.R.; 18 64-prs. M.L.R.; 12 32-prs.
Victoria	Gunboat	Albert	Steel	2	..	1883	115 0	25 0	10 0	350	400	10·0	..	One 8-in. 12-ton B.L.R.; one 6-in. 4-ton do.; two 9-prs. do.; two Nordenfelts.
Victoria	Gunboat	Victoria	Steel	2	..	1883	140 0	27 0	11 0	530	800	12·0	..	One 10-in. 25-ton B.L.R.; two 13-pr. B.L.R.; two 1-in. Nordenfelts.
Victoria	Gunboat	Batman	Iron	..	..	..	..	..	..	387	350	..	..	One 6-in. 4-ton B.L.R.; two Nordenfelts.
Victoria	Gunboat	Fawkner	Iron	..	..	..	..	..	..	387	350	..	..	One 6-in. 4-ton B.L.R.; two Gatlings.
Victoria	Gunboat	Gannet	Iron	..	..	..	..	..	..	346	500	..	..	One 6-in. 4-ton B.L.R.; two Nordenfelts.
Victoria	Gunboat	Lady Loch	..	..	..	..	..	..	..	..	..	..	..	One 6-in. 4-ton B.L.R.; two Nordenfelts.
Victoria	First class torpedo boat	Childers	Steel	1	Chiswick	1883	113 0	12 6	5 6	63	750	20·0	10	Two 1½-in. Hotchkiss guns.
Queensland	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	360	400	10·0	..	One 8-in. 11½-ton B.L.R.; one 6-in. 4-ton do.; one 3-pr. Q.F.G.; two Nordenfelts.
Queensland	Gun-vessel	Paluma	Steel	2	Glasgow	1884	115 0	25 0	10 0	360	400	10·0	..	One 8-in. 11½-ton B.L.R.; one 6-in. 4-ton do.; one 3-pr. Q.F.G.; two Nordenfelts.
Queensland	Gunboat	Otter	Steel	2	..	..	..	..	..	220	460	..	..	One 64-pr. M.L.R.
Queensland	Gunboat	Bonito	Iron	2	..	..	..	..	..	450	400			
Queensland	Gunboat	Stingaree	Iron	2	..	..	..	..	..	450	400			
Queensland	Yacht	Lucinda	..	Pad.	..	..	..	..	..	..	..			
South Australia	Cruiser	Protector	Steel	2	..	1884	188 0	30 0	12 6	920	1,640	14·0	..	One 8-in. 11½-ton B.L.R.; five 6-in. 4-ton do.; five Gatlings.

Note.—The Victorian Government also possesses two Second Class Steel Torpedo Boats and three Torpedo Launches; and the Queensland Government possesses one Second Class Steel Torpedo Boat.

II.

FOREIGN ARMOURED AND UNARMOURED SHIPS.

THE principal dimensions and other details of the ships in the following lists have been in many cases extracted from the Austrian *Marine-Almanach.* With few exceptions all details concerning the ships of any nation have been printed either in the English naval periodicals or in the English newspapers, or in those of foreign countries. Where the latter sources of information failed, the deficiency has been made up from the *Navy Estimates* submitted to the several national Parliaments, and from other public official documents. It would have been impossible in every case to note the source from which each detail was derived without overburdening the pages with references and adding enormously to the size of the book.

The alphabetical arrangement of the ships in each of the two great divisions, armoured and unarmoured, has been followed so as to facilitate reference. There being now no uniform system of classifying the ships of all nations, an attempt has been made to assimilate as far as possible the classification of foreign fleets to that adopted in the British *Navy List.* Occasionally this has been only approximately practicable. It will be observed that the distinction between the smaller gun-*vessels* and the sea-going gun-*boats* is not always apparent, and the former term, applied by some nations to craft to which we apply the latter, has, for special reasons, been preserved.

The sketches of the ships are all drawn on the same scale (except in a few cases specially named), so that their relative sizes are apparent by inspection.

The designation of foreign guns as a general rule by *centimetres* of calibre will permit easy reference to the Tables of Ordnance of the several Powers. In general, it may be stated that, as every nation is engaged in either replacing its naval ordnance with new and improved pieces, or in rearranging the armament of individual ships, it has been only possible to republish the latest accessible information on the subject. The machine gun and torpedo armaments of every fleet vary continually.

ABBREVIATIONS.

A list of Abbreviations of the several classes of ships and vessels is placed at the head of each Table. The following refer to armaments throughout:—

B.L.R.	Breech-loading rifled gun.
M.L.R.	Muzzle " " "
l.	Light gun.
M.	Machine gun.
Q.F.	Quick-firing gun.
f. tu. l. car	Fixed torpedo tube or launching carriage for Whitehead Torpedoes.
P.	Deck protected throughout.
pp.	Deck protected amidships.

The protective decks in all cases are at least one inch thick.

ARGENTINE REPUBLIC.—Armoured Ships.

c.b., central-battery ship; *c.s.t.*, coast-service turret ship.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Almirante Brown** (steel)	4200	240 0	50 0	9 (comp.)	8 (comp.)	11 & 8	20 6	2	4500	8 8-in. 11½-ton B.L.R., 6 4½-in. do. (Armstrong) 4 M.	..	1880	..	13·75	650	4300
c.s.t	**Andes**	1535	186 0	44 0	6	8 (turret)	11⅞	9 6	2	750	2 12½-ton Armstrong M.L.R., in turret, 2 lt. and 4 M.	..	1875	..	9·05	120	2880
„	**Plata**	1535	186 0	44 0	6	8 „	11⅜	9 6	2	750	2 12½-ton Armstrong R.L.R., in turret, 2 l.	..	1874	..	9·05	120	2880

It is understood that a large ironclad of above 7000 tons displacement is to be constructed in England shortly, and two small ironclads of shallow draught for river service are being built by Messrs. Laird at Birkenhead.

ARGENTINE REPUBLIC.—Unarmoured Ships.

cr., cruiser; *g.v.*, gun-vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Argentina** . .	820	192 0	27 0	Steel	13 0	1	850	1 6-in. B.L.R., 6 7-cm. Krupp, 4 M.	..	..	..	16·0	220	..
cr.	**Patagonia** . .	1530	220 0	32 10	Steel & wood	12 9	2	2400	1 10-in. B.L.R., 3 6-in. do., 6 l., 10 M.	..	1885 at Trieste.	..	14·0	350	..
g.v.	**Parana** . . .	550	142 8	25 0	Iron	11 9	1	475	2 6½-ton M.L.R., 2 lt.	..	1874	..	11·0	..	..
„	**Uruguay** . .	550	142 8	25 0	Iron	11 9	1	475	2 6½-ton M.L.R., 2 lt.. . . .	..	1874	..	11·0	..	..

4 *Gunboats* (*Rendel type*), 416 tons, 420 I.HP.; 4 *1st class Torpedo boats* (100 ft. long, of 600 I.HP. and 20 knots speed); 4 *Spar Torpedo boats*; 1 *paddle Torpedo School vessel*, Maipu; 7 *screw steam vessels*; 6 *paddle-wheel vessels*, besides steam transports, and a sailing Corvette of 650 tons.

In addition to the vessels above named the Torpedo Flotilla of the Argentine Republic will be strengthened by the following vessels, now building in England:—2 improved Rattlesnakes of 21 knots speed; 2 1st class Torpedo boats of the Coureur type improved by Thornycroft; 6 1st-class Torpedo boats of the latest Yarrow type; 8 2nd class Torpedo boats of the latest Yarrow type. A large protected cruiser, is, it is understood, to be built in England shortly.

AUSTRIA.—Armoured Ships.

b., barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast service ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Belt.	Armour. Battery or Turret.	Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers.	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.b.	**Archduke Albert** (iron)	5940	285	2	56	3	9	7	9½	22	0	1	4060	8 24-c.m. B.L.R. 15½-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1872	357,600	13·00	453	1472
b.	**Archduke Ferdinand Max** Gunnery ship (wood)	5060	262	0	52	6	5	5	..	23	6	1	3500	14 18-c.m. Krupp, B.L., 4 9-c.m. Uchatius, 5 M., 2 l.	..	1865	..	12·50	330	..
b.	**Crown Prince Rudolph** (steel)	6900	295	0	62	4	12	11	..	25	3	2	6500	3 30½-c.m. 48-ton Kr., 6 12 c.m. 11 M., 2 l.	..	1887	330,000	14·00	600	..
c.b.	**Custoza** . (iron)	7060	302	3	58	0	9	7	8¼	24	6	1	4820	8 26-c.m. 22-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1872	414,400	14·00	584	1624
c.b.	**Don Juan de Austria** (iron)	3550	240	3	50	0	8	6	9¾	20	0	1	2920	8 21-c.m. 10-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1875	..	13·50	380	2000
br.	**Habsburg** (wood)	5140	262	0	52	0	5	5	27⅞	23	9	1	3500	14 7-in. 6½-ton M.L.R. Armstrong, 4 9-c.m. Uchatius, 9 M., 2 l.	..	1865	280,672	12·00	330	..
c.b.	**Kaiser** . (wood)	5810	254	0	58	3	6	5½	31	24	3	1	3200	10 9-in. 12-ton Armstrong M.L.R., 6 9-c.m. Uch., 11 M., 2 l.	..	1871	337,200	13·00	450	1519
		..	..		..		..	..	..	20	0	2	9800	2 24-c.m. B.L.R. Krupp, 6 15-c.m. do., 11 Q.F., 2 l.	..	1889	..	19·0	..	..
c.b.	**Kaiser Max** (iron)	3550	240	3	50	0	8	6	9¾	20	0	1	2890	8 21-c.m. 10-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1875	211,600	13·00	380	2000
c.b.	**Lissa** . (wood)	6080	288	3	56	9	6	5½	30	26	0	1	4200	12 24-c.m. 15½-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1869	412,800	13·00	490	1420
c.b.	**Prince Eugen** (iron)	3550	240	6	50	0	8	6	9¾	20	0	1	2960	8 21-c.m. 10-ton Krupp, 4 9 c.m. Uchatius, 11 M., 2 l.	..	1877	..	13·00	380	2000
b.	**Princess Imperial Stefanie (was Archduke Ferdinand Max)** (steel)	5150	278	10	55	9	9	8	..	21	6	2	6500	2 30½-c.m. 48-ton Krupp, 6 15 c.m. 5-ton Krupp, 11 M., 2 l.	..	1887	300,000	17·00	400	..
c.b.	**Tegetthoff** (iron & steel)	7390	286	11	71	1	14	14	9¾	24	10	1	6500	6 28-c.m. 27-ton Krupp, 6 9 c.m. Uchatius, 11 M., 2 l.	..	1878	?247,378	14·00	670	3300
River Monitor	**Leitha** (iron & steel)	310	166	0	27	6	1¾	2½ (turret)	7½	3	7	2	320	2 15-c.m. Wahrendorf, 1 M.	..	1871	20,000	8·00	20	..
"	**Maros** (iron & steel)	310	166	0	27	6	1¾	[illegible] (turret)	7½	3	7	2	320	2 15-c.m. Wahrendorf, 1 M.	..	1871	[illegible],000	8·00	20	..

AUSTRIA.—Unarmoured Ships.

corv., corvette; *fr. cr.*, frigate-built cruiser; *g. v.*, gun-vessel; *to. g. b.*, torpedo gunboat; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g. v.	**Albatross**	570	150 11	26 3	wood	11 2	1	580	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	10·00	60	..
fr. cr.	**Archduke Frederic**	1570	173 10	39 5	wood	16 9	1	780	14 15-c.m. 3-ton Wahrendorf, 1 l.	..	1874	..	9·00	200	..
corv.	**Aurora**	1340	190 6	32 10	composite	16 1	1	1170	4 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	11·00	160	..
to. g. b.	**Blitz**	350	193 6	22 4	steel	8 0	..	2600	9 Q.F.	..	1888	..	22·0	..	..
fr. cr.	**Donau**	2510	233 4	42 8	wood	19 8	1	1430	11 15-c.m. 5-ton Krupp, 1 l.	..	1874	..	12·00	320	..
cr. P.	**Elizabeth**	4000	321 6	49 3	steel	18 7	2	9800	2 24-c.m. 27-ton B.L.R. Krupp, 6 15-c.m. 6-ton do., 11 Q.F.	..	Bldg.	..	19·0	..	..
corv.	**Fasana**	1970	223 3	39 5	wood	16 9	1	1750	4 15-c.m. 5-ton Krupp, 3 l.	..	1870	..	12·00	315	..
cr. P.	**Franz Joseph**	4000	321 6	49 3	steel	18 7	2	..	2 24-c.m. B.L.R. Krupp, 6 6-ton do., 11 Q.F.	..	1889	..	19·0	660	..
"	**Frundsberg**	1340	190 6	32 10	composite	16 1	1	1260	4 15-c.m. 3-ton Wahrenrdorf, 1 l.	..	1873	..	11·00	160	..
corv.	**Heligoland**	1820	226 6	36 2	wood	16 9	1	1860	5 15-c.m. 7-ton Krupp, 1 l.	..	1867	..	12·00	250	..
g. v.	**Hum**	900	173 10	29 6	wood	12 6	1	920	4 15-c.m. 3-ton Wahrendorf 1 l.	..	1861	..	13·00	150	..
"	**Kerka**	540	146 8	26 3	wood	11 2	1	300	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1860	..	9·00	50	..
to. g. b.	**Komet**	350	193 6	22 4	steel	8 0	..	2600	9 Q.F.	..	1888	..	22·0	..	..
fr. cr.	**Laudon**	3430	253 0	46 0	composite	20 8	1	2850	15 15-c.m. 5-ton Krupp, 7 M., 2 l.	..	1873	..	13·00	450	..
Torpedo cruiser	**Leopard**	1550	224 0	34 0	steel	14 0	2	6200	2 12-c.m. 2¼-ton Krupp, 10 Q.F. & M.	4 tu. or l.car	1886	200,000	18·30	250	..
Torpedo vessel	**Lussin**	913	200 4	26 3	steel	12 2	2	2600	2 15-c.m. 5-ton Krupp, 7 M., 1 l.	..	1883	..	14·00	200	..
cr. P.	1 unnamed	4000	321 6	49 3	steel	18 7	2	..	2 27-ton B.L.R. Krupp, 6 6-ton do., 11 Q.F.	..	Bldg.	..	19·0	660	..

AUSTRIA.—Unarmoured Ships—*continued.*

corv., corvette; *fr. cr.*, frigate-built cruiser; *g. v.*, gun-vessel; *to. g. b.*, torpedo gunboat; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at knots.
		tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
to. g. b.	**Meteor**	350	187	0	22	4	steel	16	9	2	2600	2 12-c.m. 2½-ton B.L.R. Krupp, 10 Q.F. & M.	f. tu. or l.car	1887	..	22·0	120	..
g. v.	**Narenta**	540	147	8	26	3	wood	11	2	1	310	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1860	..	9·00	50	..
„	**Nautilus**	570	150	11	26	3	wood	11	2	1	410	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	9·00	60	..
Torpedo cruiser	**Panther**	1550	224	0	34	0	steel	14	0	2	6200	2 12-c.m. (35 cal.) 2½-ton Krupp, 10 Q.F. & M.	4 f. tu. or l.car	1885	..	18·50	250	..
to. g. b.	**Planet**	480	210	0	23	0	steel	8	3	2	3500	10 Q.F.	1 l. car.	1889	..	21·0	..	..
fr. cr.	**Radetzky**	3430	253	0	46	0	composite	20	8	1	3400	15 15-c.m. 5-ton Krupp, 7 M., 2 l.	..	1872	..	14·00	450	..
„	**Saida**	2440	233	4	42	8	wood	19	1	1	2010	11 15-c.m. 5-ton Uchatius, 1 l.	..	1878	..	12·00	320	..
g. v.	**Sansego**	350	111	7	23	0	wood	9	0	1	290	2 15-c.m. 3-ton Wahrendorf	..	1861	..	9·00	45	..
Torpedo vessel.	**Sebenico**	880	187	0	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 2 M., 1 l.	..	1882	..	14·00	200	..
„	**Seehund**	1550	224	0	34	0	steel	14	0	2	6200	2 12-c.m. 2½-ton Krupp, 10 Q.F. & M.	4 tu. or l.car	1886	..	18·50	250	..
„	**Spalato**	840	179	6	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	..	14·00	150	..
Torpedo cruiser	**Tiger**	1675	233	0	32	10	steel	15	5	2	5600	4 12-c.m., 2½-ton B.L.R., 10 M.	..	1887	..	18·0	300	..
to. g. b.	**Trabant**	480	210	0	23	0	steel	8	3	2	3500	10 Q.F.	1 l. car.	Bldg.	..	21·0	..	..
Torpedo vessel	**Zara** (School ship)	840	179	6	26	3	steel	12	2	2	2600	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	.	14·00	150	..
corv.	**Zrinyi**	1340	190	6	32	10	composite	16	1	1	1170	4 15-c.m. 3-ton Wahrendorf, 1 l.	..	1871	..	11·00	160	..

Paddle-wheel vessels, Andreas-Hofer, Taurus, Trieste; two new gunboats, the Gemse and Grille, of 320 tons displacement and 360 indicated horse-power; also Yachts, Harbour Service and Training Ships, Transports, &c.

Torpedo boats. Of the First Class, *twenty-three* in number of the Falke and Habicht types, of 83 to 88 tons displacement, 800 to 900 I.HP., and *five* of 83 tons displacement, and 1000 I.HP. Each of them is armed with two machine guns; *twenty-six* of from 56 to 64 tons displacement, and 450 to 700 horse-power, 18 to 20 knots; and *eight* of 27 tons displacement, 200 to 300 horse-power, and 15 to 18 knots.

BELGIUM.

Though Belgium has no Navy properly so called, there are about a dozen steam vessels, principally employed as packets, which are under the orders of the Government, and of which several would be found useful under certain conditions of naval warfare. Seven of these steamers are of 578 tons.

BRAZIL.—Armoured Ships.

c.b., central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Belt.	Armour. Battery on Turret.	Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
River Monitor.	**Alagôas** . . (wood)	340	120	0	28	0	4½	4½ on turret	14½	4	10	2	180	1 70-pdr. Whitworth M.L.R.	..	1886	..	7·00		..
t.	**Aquidaban** (steel and wood sheathed)	4950	280	0	52	0	11 comp.	11½ comp., 10 comp. on turret	10	18	0	2	6200	4 9-in. 20-ton B.L.R. (Armstrong) 4 70-pdr. 5-ton do., 15 M.	5 f. tu. or l. car.	1885	345,000*	15·00	600	..
c.s., t.	**Bahia** . . (iron)	1000	178	0	35	0	4½	5½ on turret	10⅝	8	6	2	1640	2 7-in. M.L.R. (Whitworth), 2 M.	..	1865	..	10·00	..	..
c.s., c.b.	**Brazil** . . (iron)	1518	179	8	35	0	4½	4½ on turret	8	12	5	1	1500	4 7-in. M.L.R. (Whitworth), 4 68-pdr., 4 l., s b.	..	1864	60,000	11·30	..	..
t.	**Javary** . . (iron)	3700	240	0	58	0	12	13 on turret	9¾	11	5	2	2500	4 10-in. Whitworth M.L.R., 6 5-in. B.L.R., 5 M.	..	1875	..	11·20	200	680
c. s., t.	**Lima-Barros** . (iron)	1350	180	0	36	0	4½	4½ on turret	8½	13	5	2	2100	4 7-in. Whitworth M.L.R. .	..	1866	..	12·00	200	..
cs., c.b.	**Mariz-e-Barros** (iron)	1444	198	10	36	0	4½	4½ on turret	8	10	10	2	600	4 7-in. Whitworth M.L.R. .	..	1866	..	9·00	..	..
River Monitor	**Piauhy** . . (wood)	340	120	0	28	0	4½	4½ on turret	14½	4	10	2	180	1 70-pdr. Whitworth M.L.R. .	..	1887	..	7·00	..	..
t.	**Riachuelo** (steel and wood sheathed)	5700	305	0	52	0	11 comp.	11 comp., 10 comp. on turret	10	19	6	2	7300	4 9-in. 20-ton B.L.R. (Whitworth, altered by Armstrong), 6 5½-inch 5-ton do., 15 M.	5 f. tu. or l. car.	1883	365,000*	16·71	800	4,500 (at 15 knots)
River Monitor	**Rio Grande** . (wood)	340	120	0	28	0	4½	4½ on turret	14½	4	10	2	180	1 70-pdr. Whitworth M.L.R. .	..	1888	..	7·00	..	..
c.b.	**Sete de Setembro** (wood)	2145	219	10	46	6	4½	4½	..	12	6	2	2000	4 9-in. 18-ton Whitworth M.L.R., 5 M.	..	1874	..	12·00	..	..
t.	**Solimões** . . (iron)	3700	240	0	58	0	12	13 on turret	9¾	11	5	2	2200	4 10-in. 25-ton Whitworth M.L.R., 5 M.	..	1875	..	11·20	200	680

* Exclusive of guns and ammunition.

NOTE.—The Brazil and Lima-Barros are now used as Stationary Floating Batteries.

BRAZIL.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *g.v.*, gun-vessel; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.		NAME.	Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
cr.		**Almirante Barroso** .	1960	213	5	36	2	composite	17	5	1	2200	7 5½-in. Whitworth B.L.R., 6 M. . .	..	1882	..	12·00	..	..
,,		**Almirante Tamanderi** .	4023	270	0	46	0	steel (wood sheathed.)	18	4	2	7500	4 8-in. 12-ton B.L.R. (Armstrong), 12 6-in. 5-ton do., 16 M.	..	Bldng.	..	17·00	750	..
corv.		**Guanabàra** . . .	1900	200	0	41	2	wood	16	4	1	3000	9 70-pdr. Whitworth 6 M. 2 l. . .	..	1877	..	13·00	..	..
cr.		**Imperial Marinheiro** . (used as a training vessel.)	726	167	0	26	3	composite	11	0	1	750	6 12-c.m. B.L.R., 1 9-c.m. do., 4 M. .	..	1883	..	9·00	..	..
,,	P.	New sh . .	4030	..		..		steel	..		2	..	.. ..	..	Bldng.	..	..	..	..
corv.		**Nictheroy** . . .	1800	192	0	41	0	wood	16	0	1	1000	12 70-pdr. Whitworth 6 M. . . .	..	1862	..	8·00	..	..
,,		**Parnahyba** (Torpedo School ship)	838	170	6	26	3	composite	11	2	1	900	1 70-pdr. Whitworth 4M., 6 lt. . .	..	1878	..	10·00	..	..
cr.		**Primeiro de Março** .	726	167	3	26	3	composite	10	6	1	750	7 4½-in. Whitworth B.L.R., 4 M. . .	..	1881	..	9·00	..	..
,,		**Trajano**	1400	210	2	29	6	composite	14	9	1	2400	7 4½-in. Whitworth B.L.R., 4 M. . .	..	1873	..	13·00	..	..
corv.		**Vital de Oliveira** . .	1402	203	7	36	1	wood	13	2	1	1000	4 70-pdr. Whitworth	..	1867	..	..	..	..
cr.	P	New ship	4500	..		..		steel	..		..	5500	4 8-in. 12-ton B.L.R, 10 6 in. do., Q.F., 1 M.	..	Bldng.	..	17·0	..	..

Double-screw gunboats. — Guarany, Iniciadora, Pedro Affonso, Traripe, 250 to 330 tons ; 160 to 260 I.HP.

River-service gunboats. — Cabedello, Camocim, Cananéa, Carioca Marajó of 210 tons; 200 I.HP.

Paddle river-service gunboats.—Braconnot, Lamego, Manáos, Taquary.

Paddle steamers.—Amazonas, Felippe Camarão, Fernandes Vieira, Henrique Diaz, Tramandahy, Vidal de Negreiros.

Torpedo boats.—Five first-class, built in England in 1882, of 110 ft. in length, and 12½ ft. in breadth, indicated horse-power 600, and speed 20 knots, sixteen of smaller size, second class and Spar Torpedo Boats.

Three first-class boats of the Coureur type improved are building by Messrs. Thornycroft, of Chiswick. They are 150 feet long, 14 feet 6 inches broad, and have a displacement of 110 tons. The speed of 25 knots is guaranteed on the measured mile, and 24 knots in a two hours' trial.

Also Training and Harbour Ships and Transports.

BULGARIA.

This principality is already in possession of the nucleus of a naval force in a flotilla of eleven steamers of small size, of which one is used as the Prince's Yacht.

CHILI.—Armoured Ships.

c.b., central-battery ship; *b.*, barbette ship; *t.*, turret ship.

Class	NAME.	Displacement.	Length.	Beam.	Armour.		Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
					Belt.	Battery.					Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	**Almirante Cochrane** (iron)	3500	210 0	45 9	9	8	7¾	19 8	2	2920	4 9-in. B.L.R. 18-ton Arm., 2 7-in. do., 7 M., 4 l.	..	1874	..	13·00	500	1900
c.b.	**Blanco Encalada** (iron)	3500	210 0	45 9	9	8	7¾	19 8	2	3000	6 12-ton Armstrong M.L.R., 7 M., 4 l.	..	1875	..	12·00	500	1900
b.	**Capitan Prat** (steel sheathed and coppered)	6900	328 0	60 8	12	..	..	21 10	2	12,000	4 24-c.m. B.L.R., 8 12 c.m. do.	..	ldg.	391,000	19·00	400	..
t.	**Huascar** (iron)	1800	200 0	35 0	4½	5½ on turret	14	15 6	1	1050	2 10-in. 12½-ton Armstrong M.L.R., 2 40 pdr., 2 l.	..	1865	..	12·00	250	..

CHILI.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; P., deck protected throughout, *to.gb.*, torpedo gunboat; *g.v.*, gun vessel.

Class	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
gv.	Two gun vessels .	800	..	..	..	..	..	..	.. ..	..	..	..	..	..	..
corv.	**Abtao** (used as a transport.)	1050	227 0	29 6	composite	15 6	1	300 (nom.)	1 70-pr. B., 4 40-pr. B. Armstrong, 4 M.	..	1864	..	9·00	300	..
to.gb.	**Almirante Coudel**	750	240 0	27 6	steel	10 0	2	4500	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	..	1890	..	21·00	100	2500
to.gb.	**Almirante Lynch**	750	240 0	27 6	steel	10 0	2	4500	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	..	1890	..	21·00	100	2500
"	**Chacabuco** . .	1100	218 6	33 4	wood	17 4	1	1200	3 8-in., 2 70-pdrs., 4 40-pdr. (all B.L.R. Armstrong)	..	1866	..	10·00	400	..
cr.	**Esmeralda** P. (one inch thick)	3000	270 0	40 0	steel	18 3	2	6500	2 10-in. 25-ton Armstrong B.L.R., 6 M., 6-in. 4-ton. do., 2 Q.F., 6 M.	3 f. tu. or l.car	1883	..	18·28	600	2200
corv.	**Magellanes** . .	800	190 0	28 0	composite	14 9	2	1230	1 7-in. B.L.R., 1 64-pdr., 3 l. . .	..	1874	..	11·00	300	..
"	**O'Higgins** . .	1100	218 6	33 4	wood	17 4	1	1200	3 7-in. B.L.R., 4 40-pdr. B. (all Armstrong)	..	1866	..	10·00	500	..
"	**Pilcomayo** . .	600	171 0	27 4	wood	..	1	180 (nom.)	2 70-pdr., 2 40-pdr., 2 l. (all Armstrong)	..	1874	..	9·00	200	..
cr.	**Presidente Errazuriz**	2080	268 0	35 9	steel & copper sheathed	19 6	2	5400	4 15-c.m. B.L.R., 2 12-c.m. do., 4 Q.F., 6 M.	3 l. car	Bldg.	..	19·0	..	4500 at 12 knots
to.gb.	**Presidente Pinto** .	2080	268 0	35 9	steel & copper sheathed	19 6	2	5400	4 15-c.m. B.L.R., 2 12-c.m. do., 4 Q.F., 6 M.	3 l. car	Bldg.	..	19·0	..	4500 at 12 knots

Besides Sailing ships, there are—

Gunboats.—Five of 420 tons displacement and 7 to 10 knots speed.

Torpedo boats.—Eleven 1st class boats, mainly of 90 tons displacement, 100 feet in length, and a speed of 22 knots; 2 2nd class boats of 40 tons displacement, 50 feet long, and speed of 18 knots.

Despatch Vessel.—Amazonas.

Transport.—Angamos, built in 1876.

CHINA.—Armoured Ships.

(The Chinese Navy is divided into Provincial Fleets: Canton, Foo-chow, Shang-hai, Peiho, and North Coast.)

a.g.b., armoured gunboat; *b.*, barbette ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour.		Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
							Belt.	Turret.						Guns.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
b.	Chen-Yuen . (steel)	7430	308	5	59	0	14 comp.	12 comp.	14	20	0	2	6200	4 30½-c.m. 37-ton Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1882	..	14·50	1000	..
b.	King-Yuen . (steel)	2850	270	0	40	0	9½	8 comp.	8-in. steel dk.	16	6	2	3600	2 8¼-in. 10-ton B.L.R., 2 6-in. do., 7 M.	1 f.tu.sb. 3 l. car.	1887	..	16·50	325	..
b.	New vessel . . (steel)	2850	270	0	40	0	9½	8 comp.	..	..		2	3600	.. ..	..	Bldg.	..	..	..	..
b.	Lai-Yuen . (steel)	2850	270	0	40	0	9½	8 comp.	3-in. steel dk.	16	6	2	3600	2 8¼-in. 10-ton B.L.R., 2 6-in. 4-ton do., 7 M.	1 f.tu.sb. 3 l. car.	1887	..	16·50	325	..
b.	Ting-Yuen . (steel)	7430	308	5	59	0	14 comp.	12 comp.	14	20	0	2	6200	4 30½-c.m. 37-ton Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1881	..	14·50	1000	..
a.g.b.	Tien-Sing . (wood)	195	105	0	20	4	1⅛	8	5	7	0	2	340	1 17-c.m. Krupp . . .	..	1875	..	10·0	..	..

An armoured gunboat is building at Foo-chow.

CHINA.—Unarmoured Ships.

cr., cruiser; *fr. cr.*, frigate-built cruiser; *g.v.*, gun-vessel; P., deck protected throughout; *pp*, partial deck protected; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.		Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
													Guns.	Fish Torpedo Dis-chargers					
			tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
cr.	**Chih-Yuen**	P.	2300	250	0	38	0	steel	15	0	2	5500	3 8-in. 12-ton B.L.R., 2 6-in. 4-ton. do.	4 f. tu. or l.car	1886	..	18·00	450	..
,,	**Ching-Yuen**	P.	2300	250	0	38	0	steel	15	0	2	5500	3 8-in. 12-ton B.L.R., 2 6-in. 4-ton. do.	4 f. tu. or l.car	1886	..	18·00	450	..
,,	**Foo Chow**		1300	223	0	32	0	steel	13	3	2	1600	2 6-in. B.L.R., 4 l.	..	1887	..	13·00	..	..
fr. cr.	**Hai-An**		2630	300	0	42	0	wood	21	0	1	1750	2 21-c.m. Krupp, 20 12-c.m. do., 1 17-c.m. do.	..	1872	..	12·00	..	..
cr.	**Huan-Tai**		1300	223	0	32	10	steel	13	3	2	1600	2 15-c.m. B.L.R. Krupp, 5 12-c.m. do., 4 M.	2 f. tu. or l.car	1888	..	15·0	..	..
,,	**Kai-Chih**		2480	259	0	39	4	steel	15	2	..	3000	1 25-c.m. B.L.R., 1 17-c.m. do., 6 15-c.m. do., 6 M.	..	1884	..	15·00	..	..
g.v.	**Mei-Yun**		578	170	0	22	9	composite	9	2	1	400	1 16-c.m. Vavasseur, 2 12-c.m. Vavasseur	..	1869	..	8·00	..	..
cr.	**Nan-Schuin**		2200	253	0	36	2	steel	18	1	1	2400	2 8-in. 10-ton Armstrong B.L.R., 8 4½-in. do.	..	1884	..	15·00	..	..
,,	Two new vessels		2200	253	0	36	2	steel	18	1	2	2400	.. ..	..	Bldg.	..	15·00	..	..

cr.	**Nan-Thin**		2200	253	0	36	2	steel	18	1	1	2400	2 8-in. 10-ton Armstrong B.L.R., 8 4½-in. do.	..	1883	..	15·00	..	..
„ *pp.*	**Tshao-Yong**		1350	210	0	32	0	steel	15	8	2	2677	2 10-in. 25-ton Armstrong B.L.R., 4 4½-in. do., 10 M., 2 l.	..	1881	..	16·80	300	5380 (at 8 knots)
g.v.	**Tshen-Hai**		578	160	10	26	3	wood	10	6	1	480	1 6½-ton Armstrong M.L.R., 6 l.	..	1872	..	10·00	..	..
cr.	**Tshi-Yuen**	P.	2355	236	3	34	5	steel	15	9	2	2800	2 21-c.m. (35 calibre) Krupp, 1 15-c.m. do., 4 l., 6 M.	4 tu.	1886	..	15·00	230	..
„	**Tsi-Yuen**	P.	2355	236	3	33	0	steel	15	9	2	2800	2 21-c.m. (35 calibre) Krupp, 1 15-c.m. do., 4 l., 6 M.	4 tu.	1886	..	15·0	230	..
g.v.	**Tsing-Yuen**		578	160	10	26	3	wood	10	6	1	480	1 6½-ton Armstrong M.L.R., 6 l.	..	1872	..	10·00	..	..
cr.	**Yang-Tao**		2500	253	0	36	2	composite	18	0	2	2400	3 8-in. 10-ton B.L.R., 7 4¾-in. do.	..	1883	..	15·00	..	..
„ *pp.*	**Yang-Wai**		1350	210	0	32	0	steel	15	8	2	2580	2 10-in. 25-ton Armstrong B.L.R., 4 4½-in. do., 10 M., 2 l.	..	1881	..	16·00	300	5370 (at 8 knots)
„	**Ye-Sing**		2500	253	0	36	0	composite	18	0	1	2400	3 8-in. 10-ton B.L.R., 7 4¾-in. do.	..	1888	..	15·00	..	..
tr. cr.	Three vessels building		3400	..		..		steel	..		2	..	.. ..	..	Bldg.	..	..	..	..

Gunboats (*Rendel's System*).—Eleven of 325 to 440 tons displacement; 235 to 450 indicated horse-power, named with letters of Greek alphabet.

Gunboats (*Canton Flotilla*).—Thirteen of 100 to 350 tons displacement.

Floating Batteries.—Six with 3 12-ton Armstrong guns in a wooden fixed turret for river service.

Torpedo boats.—Twenty-two First-class, of which one is 160 ft. long, 19½ ft. broad, of 1500 horse-power, and 23 knots speed, and nine Second-class boats.

Also paddle-wheel vessels, transports, &c.

DENMARK.—Armoured Ships.

b.c., belted cruiser; *br.*, broadside ship; *c.s.*, coast-service vessel; *t.*, turret ship; f.tu., fixed tubes, and l. car., launching carriages for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
b.c.	**Absalon** . . (iron)	527	150 0	26 0	2½	2½	6	10 2	1	500	6 7½-c.m. B.L.R. Krupp, 2 M. .	..	1862	..	10·00	65	..
br.	**Denmark** . . (iron)	4747	270 0	49 6	4½	4½	18	19 10	1	1007	12 8-in. 9 ton Armstrong M.L.R., 12 6-in. Finspong M.L.	..	1864	260,000	8·00	625	..
Torpedo School Ship	**Esbern Snare** . (iron)	527	150 0	26 0	2½	2½	6	10 2	1	500	2 M.	1 f. tu. or l.car	1862	..	10·00	65	..
c.s., t.	**Gorm** . . . (iron)	2344	231 0	40 0	7	8 turret	10	14 0	2	1670	2 10-in. 18-ton Armstrong M.L.R., 3 8·7-c.m. Krupp, 4 M.	..	1870	104,000	12·25	115	..
t.	**Helgoland** . . (iron)	5347	257 6	59 2	12	10	10	18 8	2	4000	1 30½-c.m. 36-ton Krupp, 4 26-c.m. 22-ton do., 5 12½-c.m. do. 10 M.	4 f. tu. or l.car	1878	275,000	12·00	230	1070
b.	**Iver Hvitfeldt** (steel)	3260	242 0	49 6	12	8 on barbettes	..	18 0	2	5000	2 26-c.m. 28-ton Krupp, 6 12-c.m. do., 10 M.	4 f. tu. or l.car	1886	200,000	15·60	250	..
c.s., t.	**Lindormen** . . (iron)	2076	216 0	39 5	5	5 turret	9¾	13 9	2	1560	2 9-in. 13-ton Armstrong M.L.R., 3 8·7-c.m. Krupp 4 M.	..	1868	93,000	12·00	120	..
c.s., t.	New ship (2 turrets) (steel)	3290	..	..	..	..	..	..	2	..	2 28-ton B.L.R. . . .	..	Bldng.	..	15·50	..	..
c.b.	**Odin** . . . (iron)	3083	237 0	50 0	8	8	10	15 6	1	2260	4 10-in. 18-ton Armstrong M.L.R., 4 8·7-c.m. Krupp B.L.R., 6 M.	..	1872	147,000	12·40	180	560
br.	**Peder Shram** . (wood) (Harbour Service)	3373	220 0	48 5	5	4½	..	20 7	1	1680	8 8-in. 9-ton Armstrong M.L.R., 8 6-in. Finspong, & 12·26 do.	..	1864	..	11·70	300	1589
t.	**Rolf Krake** . . (iron)	1344	185 2	38 3	4½	4½	9	10 6	1	750	2 8-in. 9-ton Armstrong, 2 8·7-c.m. Krupp, 4 M.	..	1863	74,000	7·80	135	..
Torpedo Ship	**Tordenskiold** . (steel)	2400	221 6	43 3	Armour on deck 4 in. to 2 in.	8 (steel)	..	15 6	2	2600	1 30½-c.m. 52-ton Krupp, 4 12-c.m. do., 8 M.	4 f. tu. or l.car	1880	138,900	14·00	170	..
t.	**New ship** . . (steel)	3290	243 0	49 8	12	11½	8½	11 6	2	5100	2 26-c.m. 28-ton B.L. Krupp, 4 12-c.m. do., 12 M.	4 f. tu. or l. car	Bldng.	..	15·5	285	..

DENMARK.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *fr. cr.*, frigate-built cruiser; *g.v.*, gun-vessel; P., deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	**Dagmar**	1193	173 10	33 10	wood	16 0	1	800	14 5½-in. 4¾-ton Krupp, 4 M.	..	1861	50,000	9·50	150	..
g.v.	**Diana**	556	154 6	26 3	wood	10 2	1	500	6 7½-c.m. Krupp, 2 M.	..	1863	33,000	9·00	60	..
„	**Falster**	356	111 0	28 10	iron	7 6	2	510	1 10-in. 20-ton Armstrong M.L.R., 2 7½-c.m. Krupp, 2 M.	..	1873	33,000	9·80	20	..
fr. cr.	**Fyen** P.	2596	226 6	45 6	steel and iron wood sheathed	18 1	1	2700	4 long 15-c.m. 4¾-ton Krupp, 14 15-c.m. 3½-ton short do., 6 M.	2 f. tu. or l.car	1882	170,000	13·00	290	..
g.v.	**Fylla**	556	154 0	26 3	wood	10 2	1	500	6 7½-c.m. Krupp, 2 M.	..	1862	33,000	9·00	60	..
cr. (3rd class)	**Geiser**	..	257 6	27 6	steel	..	..	..	.. ..	..	Bldng.	..	..	..	..
cr.	**Hekla**	1280	233 0	32 10	steel	11 2	2	3000	6 long 15-c.m. Krupp, 10 M.	..	Bldng.	..	17.00	..	..
g.v.	**Ingolf**	870	192 0	28 0	iron	12 6	1	670	2 15-c.m. Krupp, 4 7½-c.m. do., 2 M.	..	1876	44,000	10·50	130	..
fr. cr.	**Jylland**	2457	200 3	44 3	wood	19 5	1	1350	20 6-in. Finspong M.L.R., 6 12-c.m. Krupp, 4 M.	..	1860	84,000	11·00	260	..
g.v.	**Moen**	356	111 0	28 10	iron	7 6	1	523	1 10-in. 20-ton Armstrong M.L.R., 2 8·7-c.m. Krupp, 2 M.	..	1875	..	9·20	20	..
corv.	**Saint Thomas**	1572	224 0	33 0	wood	17 0	1	1870	1 8-in. 9-ton Armstrong M.L.R., 4 12-c.m. Krupp, 3 M.	..	1871	..	13·00	190	..
cr.	**Valkyrien*** P.	2900	268 0	43 6	steel	18 0	2	5000	2 long 21-c.m. 10-ton Krupp, 6 15-c.m. long 4¾-ton Krupp, 10 M.	5 f. tu. or l.car	1887	..	17·00	450	..

* 2¼ ins. steel deck under water through the whole length of the ship.

Gunboats.—Nine in number, of 150 to 240 tons; 200 to 400 indicated horse-power.

Torpedo boats.—Four sea-going, of 96 tons, 1300 indicated horse-power and 21½ knots speed; *first class*, five, and five to be built of 35 to 65 tons displacement, and *second class*, ten, and twelve to be built.

In addition there are paddle wheel vessels, school and training ships, a Royal Yacht and a Transport.

EGYPT.

The ships now belonging to Egypt are:—

Mehemet Ali, an unarmoured iron frigate, 290 feet long, 36 feet broad; draught of water, 16 feet; displacement, 1762 tons. She is armed with 20 12-c.m. Krupp guns of 20 cwt. each, and 10 40-pdr. Armstrongs. The machinery has been removed. She is now used as a guard ship at Alexandra.

Sakkeh, a wood corvette, 210 feet long, 29 feet broad, 14½ feet draught of water, and 972 tons displacement. She is used as a guard ship at Port Said, and is armed with 10 40-pdr. B.L. Armstrongs. At present there is no machinery on board.

Mahroussa, paddle-wheel yacht of the Khedive. She is 440 feet long, 42 feet broad; draught of water, 20 feet; and displacement 4200 tons.

FRANCE.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship, f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.g.b. & b.	**Achéron*** . (steel)	1640	181 0	40 4	8	8	..	11 10	2	1700	1 27-c.m. 28-ton B.L.R., 2 10-c.m. do., 2 M.	..	1885	100,000	13·00	..	..
c.b.	**Alma** (*d*) . (wood)	3770	229 10	46 6	5⅞	4¾	26	23 11	1	1896	6 19-c.m. B.L.R., 4 12-c.m. do.	..	1867	101,200	11·89	..	..
b.	**Amiral Baudin** . (iron & steel)	11,380	321 6	69 10	21½	16½ steel	14	26 2	2	8320	3 37-c.m. (75 ton) B.L.R., 12 14-c.m. do., 8 M.	f. tu.	1883	600,000	15·00	800	3000
b.	**Amiral Duperré** (iron & steel)	11,100	311 0	66 11	21½	15½	14	26 9	2	8000	4 34-c.m. (48 ton) B.L.R., 1 16-c.m. do., 14-c.m. do., 12 M.	f. tu. or l. car.	1879	570,000	14·22	..	..
c.b.	**Atalante** (*d*) (wood)	3800	229 10	46 6	6	4¾	26	23 3	1	1640	8 19-c.m. B.L.R., 4 12-c.m. do., 6 M.	..	1868	..	11·43	..	..
b.	**Bayard** . (wood)	6000	265 9	57 2	10	8	15	24 11	2	4000	4 24 c.-m. 16-ton B.L.R., 2 19-c.m. 8-ton do., 6 14-c.m. 3-ton do., 12 M., 2 l.	..	1880	..	14·00	400	..
c.s., t.	**Bélier** (*d*) . (wood)	3600	217 0	53 0	8½	7	31½	19 1	2	1921	2 24-c.m. 16-ton B.L.R. .	..	1870	..	12·37	180	..
c.s.b.	**Belliqueuse** (*d*)(wood)	3706	230 0	46 3	6	4¾	26	22 10	1	1227	4 19-c.m. B.L.R., 4 16-c.m. do., 4 14-c.m. do., 6 M.	..	1865	99,176	11·78	..	..
c.s., t.	**Bouledogue** (*d*)(wood)	3400	217 0	53 0	8½	7	31½	18 2	2	1827	2 24-c.m. 16-ton B.L.R. .	..	1872	..	12·25	180	..
b.	**Brennus** (steel)	10,826	344 6	65 0	17½ comp.	17½ comp.	..	27 10	3	5500	4 34-c.m. B.L.R., 10 14-c.m. do., 7 M.	..	Bldg.	804,000	18·00	..	..
a.c.t.	**Bruix** . (steel)	4745	348 0	46 0	3½	..	..	19 2	2	8300	2 8-ton. B.L.R., 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	..	..	..
c.s.b.	**Caiman** (iron and steel)	7230	278 3	59 0	19½	17¾	12	24 7	2	8000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1885	..	14·50	500	..
c.s., t.	**Cerbère** (*d*) (wood)	3800	196 10	53 0	8½	7	31½	19 7	2	1800	2 24-c.m. 16-ton B.L.R. .	..	1868	137,600	11·39	..	..
a.c.t.	**Chansy** . (steel)	4745	348 0	46 0	3½	..	..	19 2	2	8300	2 8-ton B.L.R.. 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	..	..	..
b.	**Charles Martel** (steel) (bldng. suspended)	10,650	344 6	64 0	17½	17½	..	26 9	3	5500	4 34-c.m. B.L.R., 8 14-c.m. do., 7 M.	..	..	..	15·00	..	..

(*d*) Ships marked thus are, it is stated, unfit for service or for repair.

FRANCE.—Armoured Ships—*continued.*

a.c., armoured cruiser; ***a.g.b.***, armoured gunboat; ***b.***, barbette ship; ***c.b.***, central-battery ship; ***c.s.***, coast-service vessel; ***t.***, turret ship; **f. tu., l. car.**, fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Armour. Belt.	Armour. Battery or Turret.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.c.t.	**Charner** . (steel)	4745	348 0	46 0	3½	..	..	19 2	2	8300	2 8-ton B.L.R., 6 14-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	..	..	..
a.g.b. & b.	**Cocyte** . (steel)	1640	181 0	40 4	8	8	..	11 10	2	1700	1 27-c.m. 28-ton B.L.R., 2 10-c.m. do., 2 M.	..	1887	100,000	13·00	..	..
c.b.	**Colbert** . (wood)	8457	317 9	56 6	8½	6¼	34	28 5	1	4652	8 27-c.m. 23-ton B.L.R., 2 24-c.m. 16-ton do., 6 14-c.m. 3-ton do., 8 M.	..	1875	..	14·47	590	..
c.b. & b.	**Courbet** (iron & steel), formerly called Foudroyant.	9700	312 0	67 0	15	9½	..	25 0	2	8100	4 34-c.m. 48-ton B.L.R., 4 27-c.m. 28-ton do., 6 14-c.m. 3-ton do., 12 M.	4 f. tu. or l. car.	1881	800,000	14·20	628	3100
c.b. & b.	**Dévastation** (iron & steel)	10,100	312 0	67 0	15	9½	12½	25 0	2	8320	4 34-c.m. 48-ton B.L.R., 4 27-c.m. 23-ton do., 6 14-c.m. 3-ton do., 8 M.	4 f. tu. or l. car.	1879	..	15·17	610	2800
b.	**Duguesclin** (steel, sheathed with wood and coppered)	5869	266 0	57 0	9	8 barbettes compound	15	25 3	2	4100	4 24-c.m. 16-ton B.L.R., 1 19-c.m. 8 ton do., 6 14-c.m. 3-ton do., 2 Q.F., 12 M.	..	1883	220,000	14·00	400	..
a.c.	**Dupuy de Lôme**	6297	376 0	51 6	4	4	..	23 0	2	14,000	2 19-c.m. 8-ton B.L.R., 6 16-c.m. 5-ton do., 8 Q.F., 8 M.	4 f. tu. or l.car	Bldg.	Estimated 416,000	20·0	..	4000
a.g.b. & b.	**Flamme** . (special metal)	1045	165 0	32 7	10	4-in. shield	..	10 4	2	1500	1 24-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 f. tu.	1885	68,000	13·00	50	..
c.b.	**Flandre** (*d*) . (wood)	5997	295 3	56 6	6	4¼	26	27 6	1	3536	8 24-c.m. B.L.R., 5 19-c.m. do., 6 M.	..	1864	213,280	13·30	..	..
b.	**Formidable** (steel)	11,441	321 6	69 6	21½	17¾	14	26 2	2	6500 8320 forced draught.	3 37-c.m. 75 ton B.L.R., 12 14-c.m. 3-ton do., 8 M.	f. tu.	1885	467,520 hull, 85,800 machinery.	15·00	600	..
c.b. & b.	**Friedland** . (iron)	8540	317 0	58 0	8	7	15	29 11	1	4428	8 27-c.m. 23-ton B.L.R., 8 14-c.m. 3-ton do., 1 12 c.m. do., 8 M.	2 f. tu. or l. car.	1873	..	13·30	630	..

c.s., t.	**Fulminant** (iron and steel)	5574	248	0	57	9	13	12	16	21	4	1	3550	2 27-c.m. 23-ton B.L.R., 4 12-c.m. do., 4 M.	2 l.car.	1877	..	13·22	275	..
c.s., b.	**Furieux** (iron & steel)	5700	247	10	59	0	20	$17\frac{3}{4}$	..	21	9	2	4000	2 34-c.m. 48-ton B.L.R., 4 10-c.m., 4 M.	..	1883	264,640	14·00	290	1500
a.g.b. & b.	**Fusée** (steel, wood sheathed & coppered)	1045	165	0	32	7	10	4-in. shield	..	10	4	2	1500	1 24-c.m. 16-ton B.L.R., 1 9 c.m. do., 2 M.	1 f. tu.	1884	68,000	13·00	50	..
,,	**Grenade** (steel wood sheathed & coppered)	1045	165	0	32	7	10	4-in. shield	..	10	4	2	1500	1 27-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 tu.	Bldg.	68,000	13·00	50	..
c.b.	**Héroine** . (iron)	5887	262	5	56	0	6	$4\frac{1}{2}$	26	27	7	1	3318	8 24-c.m. 16-ton B.L.R., 3 19-c.m. 8-ton do., 4 14-c.m. 3-ton do., 6 M.	..	1863	213,000	13·00	500	..
b.	**Hoche** (iron & steel)	10,581	330	0	65	7	18	16	..	27	3	2	7000	2 34-c.m. 52-ton B.L.R., 2 27-c.m. 28-ton do., 18 14-c.m. 3-ton do., 8 M.	4 f. tu. or l. r.	1886	380,000 hull, 120,000 machinery	15·00	600	4000
Armoured floating battery	**Imprenable** (*d*) (iron)	1420	129	6	51	10	$5\frac{1}{2}$	$4\frac{1}{4}$	16	11	3	2	411	2 24-c.m. B.L.R., 2 16-c.m. do., 2 12-c.m. do.	..	1867	..	5·51	..	..
c.s., b.	**Indomptable** (iron and steel)	7168	279	10	59	0	20	$17\frac{3}{4}$	..	23	6	2	6000	2 42-c.m. (75-ton) B.L.R., 4 10-c.m., 4 M.	..	1883	..	14·50	800	..
c.s., t.	**Jemmapes** . .	6590	293	0	57	5	$17\frac{3}{4}$	..	..	..		2	7500	2 34-c.m. B.L.R., 4 10-c.m. Q.F., 4 other do., 10 M.	4 f. tu. or l. car	Bldg.	500,000	16·5	..	..
c.b. & b.	**La Galissonnière** (wood)	4700	255	8	49	0	6	$4\frac{3}{4}$	26	23	9	2	2370	6 24-c.m. 16-ton B.L.R., 6 14-c.m. 3-ton do., 6 M.	..	1872	..	13·08	500	..
a.c., t.	**Latouche Treville** (steel)	4745	348	0	46	0	$3\frac{1}{2}$	$3\frac{3}{4}$ conning tower.	..	19	2	2	8300	2 8-ton B.L.R., 6 47-c.m. 3-ton do., 14 Q.F. and M.	..	Bldg.	360,000	..	..	..
b.	**Magenta** (iron and steel)	10,581	330	0	65	7	18	16	..	27	3	2	7000	4 34-c.m. 52-ton B.L.R., 17 14-c.m. 3-ton do., 20 M.	4 f. tu. or l. car.	1890	760,960	15·00	600	4000
b.	**Marceau** (iron & steel)	10,581	330	0	65	7	18	16	..	27	3	2	7000	4 34-c.m. 52-ton B.L.R., 17 14-c.m. 3-ton do., 20 M.	4 f. tu. or l. car	1887	769,080	15·00	600	4000
c.b. & b.	**Marengo** . (wood)	7900	282	6	56	10	8	$6\frac{1}{4}$	32	27	8	1	3673	4 27-c.m. 27-ton B.L.R., 4 24-c.m. 16-ton do., 7 12-c.m. do., 12 M.	..	1869	280,000	13·49	650	..
a.g.b. & b.	**Mitraille** (steel, wood sheathed and coppered)	1045	165	0	32	7	10	4-in. shield	..	10	4	2	..	1 27-c.m. 16-ton B.L.R., 1 9-c.m. do., 2 M.	1 f. tu.	1886	70,000	13·00	50	..
c.b.	**Montcalm** (*d*) (wood)	3621	230	3	46	1	$5\frac{7}{8}$	$4\frac{3}{4}$	26	23	7	1	1830	6 19-c.m. 8 ton B.L.R., 4 12-c.m., do., 8 M.	..	1868	..	11·65	..	..

(*d*) Ships marked thus are, it is stated, unfit for service or for repair.

FRANCE.—Armoured Ships—*continued.*

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length at Water Line.		Beam.		Armour.		Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
							Belt.	Battery or Turret.						Guns.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
b.	**Neptune** (iron & steel)	10,581	330	0	65	7	18	16 barbettes	..	27	3	2	7000	4 34-c.m. 52-ton B.L.R., 17 14-c.m. 2½-ton do., 20 M.	4 f. tu. or l. car.	1887	780,000 including armament	15·00	600	4000
c.b. & b.	**Océan** . (wood)	7500	282	6	56	10	8	6¼	32	27	3	2	3781	4 27-c.m. 23-ton B.L.R., 4 24-c.m. 16-ton do., 8 14-c.m. 3-ton do., 8 M.	..	1868	..	13·70	650	..
c.s., t.	**Onondaga** (*d*) (iron)	2600	228	4	51	2	5½	12¾	12	12	7	2	642	4 24-c.m. 16-ton B.L.R.	..	1863	..	6·46	170	..
a.g. & b. b.	**Phlégéthon** (steel)	1640	181	10	40	4	8	8	..	11	10	2	1700	1 27-c.m. 28-ton B.L.R., 1 12-c.m. do., 2 M.	..	Bldg.	142,000	13·00	..	..
Armoured floating battery	**Protectrice** (*d*) (iron)	1420	129	6	51	10	5½	4¼	15¾	12	0	2	..	4 19-c.m. 8-ton B.L.R., 1 l.	..	1866	..	6·0	..	..
c.b.	**Provence** (*d*) (wood)	5819	262	5	55	10	6	4¼	26	27	2	2	3064	8 24-c.m. B.L.R., 3 19-c.m. do., 2 14-c.m. do., 3 12-c.m. do.	..	1863	..	13·70	.	..
c.b. & b.	**Redoutable** (iron & steel)	9200	318	2	64	8	14	9½	15	25	6	2	6071	8 27-c.m. 24-ton B.L.R., 6 14-c.m. 3-ton. do., 8 M.	..	1876	..	14·66	510	2800
c.b.	**Reine Blanche** (*d*) (wood)	3900	230	3	46	2	6	4¾	26	23	8	1	1860	6 16-c.m. 8-ton B.L.R., 4 12-c.m. 3-ton do., 6 M.	..	1868	..	11·80	250	..
c.s., b.	**Requin** . (iron & steel)	7200	279	10	59	0	19½	17¾	..	24	7	2	6000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1885	..	14·00	500	..
c.b.	**Revanche** (*d*) (wood)	5819	262	5	55	10	6	4½	26	27	1	2	3187	8 24-c.m. 16-ton B.L.R., 3 19-c.m. 8-ton do., 4 14-c.m. 3-ton do.	..	1865	..	13·25	500	..
c.b. & b. t.	**Richelieu** (wood)	9100	323	6	57	10	8½	6¼	..	27	11	2	4006	6 27-c.m. 23-ton B.L.R., 5 24-c.m. 16-ton do., 8 14-c.m. 3-ton do., 12 M.	..	1873	..	13·11	640	..
c.b.	**Savoie** (*d*) . (wood)	6000	262	5	55	10	6	4¼	26	28	0	1	3318	8 24-c.m. 16-ton B.L.R., 3 19-c.m. 4 14-c.m. do.	..	1864	..	13·47	..	..

a.g.b. & b.}	**Styx**	(steel)	1610	181	10	40	4	8	8	..	11	10	2	1700	1 27-c.m. 27-ton B.L.R., 1 12-c.m., 2 M.	..	Bldg.	142,000	13·00	..	..
c.b. & b.	**Suffren**	(wood)	7600	282	6	57	10	8	6¼	32	29	10	1	4288	4 27-c.m. 23-ton B.L.R., 4 24-c.m. 9½-ton do., 6 14-c.m. 3-ton do., 12 M.	4 f. tu. or l. car.	1870	..	14·30	700	..
c.s., b.	**Taureau** (d)	(wood)	2700	194	9	47	3	6	4¾	26	17	9	2	1800	1 27-c.m. 24-ton B.L.R.	..	1865	..	12·54	170	..
c.s., t.	**Tempête**	(iron & steel)	4523	248	0	57	9	13	12	15¾	16	9	1	1745	2 27-c.m. 28-ton B.L.R., 4 M.	..	1876	..	10·20	120	..
c.s., b.	**Terrible**	(iron & steel)	7200	279	10	59	0	19½	17¾	..	24	7	2	6000	2 42-c.m. 75-ton B.L.R., 4 10-c.m. do., 4 M.	..	1881	..	14·50	500	..
c.b.	**Thétis** (d)	(wood)	3621	230	3	46	2	6	4¾	26	20	10	1	1859	6 19-c.m. 8-ton B.L.R., 4 14-c.m. do., 6 M.	..	1877	..	12·00	250	..
c.s., t.	**Tigre** (d)	(wood)	3500	216	6	52	10	9	7	..	18	9	2	1880	2 24-c.m. 16-ton B.L.R.	..	1871	..	12·09	180	..
c.s., b.	**Tonnant**	(iron & steel)	4707	248	7	58	5	18	14½	15¾	17	3	1	1760	2 34-c.m. 48-ton B.L.R., 4 M.	..	1880	..	11 00	120	..
c.s., t.	**Tonnerre**	(iron & steel)	5700	248	0	57	9	13	12	15¾	21	4	1	4165	2 27-c.m. 28-ton B.L.R., 4 10-c.m. 4 M.	..	1875	..	14·01	285	..
c.s., t.	**Trehouart**	(steel)	6590	293	0	57	5	17¾	..	..	..		2	7500	2 34-c.m. B.L.R., 4 10-c.m. Q.F., 4 other do., 10 M.	4 f. tu. or l. car	*	500,000	16·5	..	..
c.b. & b.	**Trident**	(wood)	8800	317	9	56	4	8½	6¼	34	29	1	1	4652	8 27-c.m. 23-ton B.L.R., 2 24-c.m. 16-ton do., 6 14-c.m. 3-ton do., 4 M.	2 f. tu. or l. car.	1876	..	14·17	540	..
,,	**Triomphante**	(wood)	4700	258	2	48	9		4¾	26	22	5	1	2200	6 24-c.m. 16-ton B.L.R., 1 19-c.m. 8-ton do., 8 14-c.m. 3-ton do., 1 12-c.m. do.	..	1877	..	12·89	500	..
b.	**Turenne**	(wood)	6400	265	9	57	2	10	8	15	23	11	2	3955	4 24-c.m. 16-ton B.L.R., 2 19-c.m. 8-ton do., 6 14-c.m. 3-ton do., 12 M.	..	1879	..	14·14	400	..
c.b.	**Valeureuse** (d)	(wood)	5774	262	5	56	4	6	4½	..	27	6	1	3383	8 24-c.m. B.L.R., 1 19-c.m. 8-ton do., 6 16-c.m. do., 1 12-c.m. do.	..	1864	..	13·83	..	..
c.s., t.	**Valmy**		6590	293	0	57	5	17¾	..	..	..		2	7500	2 34-c.m. B.L.R., 4 10-c.m. Q.F., 4 other do., 10 M.	4 f. tu. or l. car	Bldg.	500,000	16·5	..	..
b.	**Vauban**	(steel)	5900	267	9	57	3	10	8	15	24	0	2	4060 (forced draught)	4 24-c.m. 16-ton B.L.R., 1 19-c.m. do., 614-c.m. 3-ton do., 12 M.	..	1882	..	14·32 forced draft.	400	..
c.s., t.	**Vengeur**	(iron & steel)	4523	248	0	57	9	13	12	15¾	16	9	2	2319	2 34-c.m. 48-ton B.L.R., 4 M.	..	1878	..	10·83	120	..
c.b. & b.	**Victorieuse**	(wood)	4600	258	2	48	9	6	4¾	26	22	5	1	2214	6 24-c.m. 16-ton B.L.R., 1 19-c.m. 8-ton do., 4 14-c.m. 3-ton do., 2 10-c.m. do.	..	1875	..	12·75	300	..

(d) Ships marked thus are, it is stated, unfit for service or for repair.

* Building at Lorient.

FRANCE.—Unarmoured Ships.

The divisions of the French unarmoured ships follow the official classification. The designation of each class is made, wherever practicable, to correspond with the usual parallel English equivalent. The French system of nomenclature is based on two distinct principles—that of the design of a ship, and that of the service for which a ship is intended. *Eclaireurs d'Escadre* are classed as sloops, that being the nearest English equivalent. *Avisos* are classed as despatch vessels to distinguish them from the *Canonnières de Station*, classed as gun-vessels. The *Canonnières de Station* differ little from British sea-going gun-*boats*; they have been classed as gun-*vessels* to distinguish them from the several kinds of French gun boats.

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat;
P. deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dischargers for Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
fr.c.	**Alger P**	4160	346 0	45 3	steel	19 6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do., 4 Q.F., 6 M.	4 f. tu. or l.car	Bldg.	280,000	19·00	..	..
fr.c.	**Aréthuse**	3400	277 6	43 6	wood	21 9	1	4200	4 16-c.m. 5-ton B.L.R., 22 14-c.m. 3-ton. do., 8 M.	..	1882	..	14·00	..	..
g.v.	**Aspic**	480	145 4	23 10	composite	10 6	1	453	2 14-c.m. 3-ton B.L.R., 2 10-cm. 24-cwt. do.	..	1880	..	10·30	..	..
sl.	**Beautemps-Beaupré** . .	1350	204 8	34 2	wood	15 10	1	985	6 14-c.m. 3-ton B.L.R., 4 M. . . .	..	1872	..	12·60	..	..
d.v.	**Bisson**	880	199 5	28 5	wood	12 8	1	849	3 14-c.m. 3-ton B.L.R., 1 10-c.m. 24-cwt. do., 5 M.	..	1874	..	11·78	..	..
to.g.b.	**Bombe**	320	196 10	21 7	steel	5 11	2	1800	3 3-in. Q.F., 3 M. . . .	2 f. tu. or l.car	1885	..	*18·00	..	..
sl.	**Bougainville** . .	800	182 0	31 9	wood	12 9	1	449	6 12-c.m. B.L.R.	..	1859	..	9·34	..	..
d.v.	**Bourayne** . .	1290	204 8	34 4	wood	15 10	1	768	6 14-c.m. B.L.R., 2 M.	..	1869	..	11·20	..	..
d.v.	**Boursaint**	780	198 4	28 0	wood	12 8	1	679	1 14-c.m. 3-ton B.L.R., 2 10 c.m. 3-ton do., 4 M.	..	1872	..	11·51	..	..
"	**Bouvet**	870	197 6	28 0	wood	12 2	1	817	3 14-c.m. 3-ton B.L.R., 1 10-c.m 24-cwt., do., 3 M.	..	1876	..	11·80	..	..

g.v.	**Capricorne**		480	148	4	23	10	wood	10	5	1	443	2 14-c.m. 3-ton B.L.R., 2 10-c.m. 24 cwt. do.	..	1882	..	11·18	..	..
tr., cr.	**Catinat**		450	197	0	23	0	steel	10	6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M.	..	Bldg.	..	18·5	..	..
fr.c.	**Cecille**	P.	5766	378	9	49	3	iron and steel	19	9	2	9600 (forced draught)	6 16-c.m. 5-ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 10 M.	4 f. tu. or l.car	1888	hull, 181,666; engines, 116,000.	19·00	..	..
g.v.	**Chacal**		460	142	6	24	4	wood	9	5	2	251	1 14-c.m. 3-ton B.L.R., 1 10-c.m., 24 cwt. do., 2 M.	..	1868	..	9·13	..	..
cr.	**Champlain**		2000	258	10	35	8	wood	16	0	1	1953	10 14-c.m. 3-ton do.	..	1872	..	14·29	..	..
d.v.	**Chasseur**		930	199	5	28	5	wood & iron	12	7	1	850	4 14-c.m. 3-ton B.L.R. 4 M. 1 l.	..	1878	..	11·06	..	..
cr.	**Château Renault**		1850	262	2	35	3	wood	18	2	1	1701	7 14-c.m. 3-ton B.L.R.	..	1868	..	14·27	..	..
,,	**Clorinde** (Requires repair)		1800	..		..		..	..		..	..	12 16-c.m. 5-ton B.L.R.	..	1857	..	10·00	..	..
cr.	**Coetlogon**	P.	1850	312	0	30	5	steel	14	0	2	6000	4 14-c.m. B.L.R, 3 Q.F., 4 M.	5 f. tu. or l.car	Bldg.	134,000	19·50	200	2400
g.v.	**Comete**		495	151	6	24	9	composite	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	..	..	..
to.cr.	**Condor**		1280	216	6	29	3	steel	15	5	2	3800	5 10-c.m. 24 cwt. B.L.R., 6 M.	5 f. tu. or l.car	1885	80,000	17·70	..	..
cr.	**Cosmao**	P.	1850	312	0	30	5	steel	14	0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M.	5 f. tu. or l.car	1888	133,000	19·50	200	2400
g.v.	**Crocodile**		450	141	10	24	0	composite	9	5	1	441	2 14-c.m. B.L.R.	..	1874	..	9·68	..	..
to.g.b.	**Couleuvrine**		320	196	10	21	7	steel	5	11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
,,	**Dague**		320	196	10	21	7	steel	5	11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
cr.	**Davout**	P.	3027	297	6	40	0	steel	17	6	2	9000	4 16-c.m. B.L.R., 4 Q.F., 6 M.	4 f. tu. or l.car	Bldg.	..	20·00	480	400 12½ kts.
sl.	**Dayot**		1350	204	8	34	4	wood	15	10	1	917	1 16-c.m. 5-ton B.L.R., 5 14-c.m. do., 2 M.	..	1869	..	11·76	..	..
cr.	**Decrès** (Requires repair)		1800	244	3	38	8	wood	18	2	1	1478	1 16-c.m. 5-ton B.L.R., 9 14-c.m. 3-ton do.	..	1866	..	12·04	..	..
cr.	**Desaix**		1700	259	2	34	8	wood	17	7	1	1442	4 10-c.m. B.L.R., 2 M.	..	1866	..	14·21	..	..
,,	**D'Estaing**		2400	262	5	37	5	wood & iron	18	8	1	3700	15 14-c.m. 3-ton B.L.R., 10 M.	..	1879	..	15·31	..	..
sl.	**D'Estrées** (Requires repair)		1340	207	4	34	0	wood	15	9	1	1003	1 16-c.m. 5-ton B.L.R., 5 14-c.m. 3-ton do., 2 M.	..	1867	..	12·30	..	..

* Speed on measured mile 19·50.

FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dis-chargers for Fish Tor-pedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
to.g.b.	Dragonne	320	196 10	21 7	steel	5 11	2	1800	3 3-inch Q.R., 3 M. . . .	2 f. tu. or l.car	1885	..	18·00	..	..
fr.c.	Dubourdieu	3400	253 7	46 6	wood	22 10	1	3300	4 16-c.m. 5-ton B.L.R. 14 14-c.m. 3-ton B.L.R.	1 f. tu. or l.car	1884	hull, 95,833; machinery, 30,720; equipment, 28,000.	14·00	..	..
sl.	Duchaffault . . .	1340	204 8	34 2	wood	16 0	1	1214	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1872	..	12·72	..	..
"	Ducouedic . . .	1340	204 8	34 2	wood	16 6	1	769	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1869	..	11·57	..	..
cr.	Duguay Trouin . . .	3300	296 3	43 4	iron & wood	20 6	1	3740	5 19-c.m. 8-ton B.L.R., 5 14-c.m. 3-ton. do.	2 f. tu. or l.car	1877	..	15·90	430	..
g.v.	Dumont d'Urville .	860	201 11	28 6	wood	13 8	1	850	4 14 c.m. 3-ton B.L.R. . . .	..	1878	..	11·60	..	..
cr.	Du Petit Thouars . .	2000	257 10	35 9	wood	16 0	1	2018	10 14-c.m. 3-ton B.L.R. . . .	..	1874	..	15·07	..	..
fr.cr.	Duquesne	5800	333 5	50 3	iron & wood	25	1	6589	7 19-c.m. 8-ton B.L.R., 14 14-c.m. 3-ton do., 8 M. 1 l.	..	1876	..	16·90	600	..
cr.	Éclaireur	1830	236 3	35 5	iron & wood	17 0	1	2050	8 14-c.m. 3-ton B.L.R., 2 M. . .	..	1877	..	15·00	..	..
to.cr.	Epervier	1280	216 6	29 3	steel	15 5	2	3200	5 10-c.m. B.L.R., 6 M. . . .	5 f. tu. or l.car	1885	80,000	17·00	..	..
g.v.	Etendard	510	142 6	24 4	wood	9 5	2	232	1 19-c.m. B.L.R., 1 12-c.m. do. .	..	1868	..	9·00	..	..
g.v.	Etoile	450	149 3	24 7	composite	8 4	2	450	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1885	..	10·00	..	..

cr.	**Fabert**		2100	249	4	6	30	wood	18	4	1	1107	8 14-c.m. 5-ton B.L.R. . . .	..	1874	..	12·42	..	..
g.v.	**Fanfare**		510	142	0	24	4	wood	9	5	2	233	1 19-c.m. B.L.R., 1 12-c.m. do. .	..	1868	..	8·39	..	..
to.cr.	**Faucon**		1280	216	6	29	3	steel	15	5	2	3200 (forced draught)	5 10-c.m. B.L.R., 6 M. . .	5 f. tu. or l.car	1887	80,000	17·5	..	..
to.g.b.	**Fleche**		320	196	10	21	7	steel	5	11	2	1800	3 3-inch Q.F., 3 M. . . .	2 f. tu. or l.car	1885	..	18·00	..	..
tr.cr.	**Fleurens**		1310	230	0	29	6	steel	15	0	2	4000	5 10-c.m. B.L.R., 2 6½-c.m., do. 4 Q.F.	..	Bldg.	116,000	18·0	..	..
cr.	**Forbin** . . .	P.	1850	312	0	30	5	steel	16	0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M .	5 f. tu. or l.car	1888	..	19·50	200	2400
„	**Forfait**		2400	249	4	38	0	wood & iron	18	0	1	2764	15 14-c.m. 3-ton B.L.R., 2 l., 6 M. .	..	1879	..	13·44	..	..
g.v.	**Fulton**		825	199	5	28	5	wood	12	8	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1887	37,000	13·00	..	..
„	**Gabes**		490	151	6	24	9	comp.	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	11·00	..	..
„	**Gladiateur** . . .		490	142	0	24	4	wood	9	5	2	218	1 14-c.m. B.L.R., 1 12-c.m. do., 2 M.	..	1868	..	9·50	..	..
sl.	**Hamelin**		1340	207	7	34	2	„	15	10	1	1155	1 16-c.m. B.L.R., 5 14-c.m. B.L.R., 2 M.	..	1866	..	12·58	..	..
d.v.	**Hirondelle**		1040	249	6	30	4	wood	12	8	2	1780	2 19-c.m. 24-cwt. B.L.R. . .	..	1869	..	15·50	..	..
sl.	**Hugon**		1340	204	5	34	2	„	15	10	1	1054	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1872	..	11·72	..	..
d.v.	**Hussard**		880	201	10	28	6	„	13	7	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1877	..	12·08	..	..
g.v.	**Hyène**		470	142	0	24	5	„	9	5	2	258	1 14-c.m. B.L.R., 1 10-c.m. do. .	..	1868	..	9·06	..	..
tr.cr.	**Iberville**		450	197	0	23	0	steel	10	6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	Bldg.	52,000	18·5	..	..
d.v.	**Inconstant** . . .		825	199	5	28	5	wood	12	7	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1886	37,000	13·00	..	..
cr.	**Infernet**		1931	262	2	35	9	„	18	4	1	1815	8 14-c.m. 3-ton B.L.R.. . .	..	1869	..	13·90	..	..
fr.c.	**Iphigénie** (Training ship) .		3200	244	6	46	6	„	22	4	1	2800	2 16-c.m. 5-ton B.L.R., 18 14-c.m. 3-ton do., 10 M., 3 l.	..	1881	..	14·60	..	..
fr.cr.	**Isly** . . .	P.	4160	346	0	43	6	steel	19	6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do., 4 Q.F., 6 M.	4 f. tu. or l.car	Bldg.	283,240	19·00	..	..
Torpedo Depôt Ship.	**Japon**		3970	315	0	39	0	iron	19	6	1	1500	1 14-c.m. 3-ton B.L.R., 1 10-c.m. do.	..	1859	..	12·4	..	..

FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
fr.c.	Jean Bart . . . P	4160	346 0	43 6	steel	19 6	2	8000	4 16-c.m. 5-ton B.L.R., 6 14-c.m. 3-ton do.	4 f. tu. or l.car	1889	283,240	19·00	..	..
sl.	Kerguelen	1340	204 5	34 2	wood	15 10	1	1200	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1872	..	12·76	..	..
d.v.	Labourdonnais . . .	860	199 5	28 5	„	12 7	1	787	4 14-c.m. 3-ton B.L.R. . . .	..	1875	..	11·69	..	..
cr.	Laclocheterie . . .	2100	262 2	35 9	„	18 4	1	1918	8 14-c.m. 3-ton B.L.R., 2 l. . .	..	1872	..	13·73	300	..
„	Lalande . . . P.	1877	311 6	31 2	steel	14 0	2	6000	2 14 c.m. B.L.R., 3 Q.F., 4 M. .	5 f. tu. or l.car	1888	133,800	19.50	200	2400
to.g.b.	Lance	320	196 10	21 7	„	5 11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1886	..	18·00	..	..
cr.	Lapérouse	2400	262 5	37 5	wood & iron	18 8	1	2280	15 14-c.m. 3-ton B.L.R., 6 M., 2 l. .	..	1877	..	14·73	..	..
tr.sl.	Lavoisier	450	197 0	23 0	steel	10 6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	Bldg.	52,000	18·5	..	..
to.sl.	Leger	450	197 0	23 0	steel	10 6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	Bldg.	52,000	18·5	..	..
to.sl.	Levrier	450	197 0	23 0	steel	10 6	2	2200	1 6½-c.m. Q.F., 3 other Q.F., 2 M. .	..	Bldg.	52,000	18·5	..	..
sl.	Limier	1330	207 4	34 0	wood	15 10	1	1084	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1866	..	11·80	..	..
„	Linois (Requires repair) .	1210	203 5	32 2	wood	15 2	1	720	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1867	..	11·50	..	..
g.v.	Lion	470	151 6	24 9	composite	10 6	1	400	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	11·00	..	..
„	Lionne	500	141 9	23 11	„	9 6	1	426	1 14-c.m. B.L.R., 2 M., 2 l. . .	..	1877	..	9·81	..	..
„	Lutin	490	141 9	23 11	„	9 4	1	427	2 14-c.m. B.L.R., 2 l. . . .	..	1877	..	10·00	..	..
„	Lynx	485	141 9	23 11	„	9 4	1	427	2 14-c.m. B.L.R., 2 l. . . .	..	1878	..	10·38	..	..

cr.	**Magon**		2390	249	4	38	0	wood & iron	18	0	1	2462	15 14-c.m. 3-ton B.L.R., 6 M., 2 l.	..	1881	..	14·17	..	..
g.v.	**Météore**		470	151	6	24	9	composite	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	1884	..	10·00	..	..
sl.	**Milan**		1540	303	2	32	10	steel	14	7	2	4132	4 10-c.m. B.L.R., 8 M.	2 f. tu. or l.car	1886	..	18·00	..	..
fr.c.	**Minerve** (Requires repair)		2800	246	9	42	8	wood	21	4	1	1601	14 14-c.m. 3-ton B.L.R., 5 M.	..	1865	..	10·91	..	..
fr.c.	**Naiade**		3500	246	0	47	2	wood & iron	22	10	1	3260	2 16-c.m. 5-ton B.L.R., 18 14-c.m. 3-ton do., 4 M., 1 l.	4 f. tu. or l.car	1881	..	13·68	..	..
cr.	**Nielly**		2300	262	5	37	5	,,	18	8	1	2921	15 14-c.m. 3-ton B.L.R., 10 M.	..	1880	..	15·23	..	..
d.v.	**Papin**		825	199	6	28	6	wood	13	7	1	850	4 14-c.m. 3-ton B.L.R.	..	1886	37,000	13·00	..	..
d.v.	**Parseval**		790	197	6	28	0	,,	12	2	1	817	4 14-c.m. 3-ton B.L.R.	..	1879	..	12·33	..	..
cr.	**Primauguet**		2400	262	5	37	5	wood & iron	18	8	1	2268	15 14-c.m. 3-ton B.L.R., 10 M.	..	1882	..	14·50	..	..
sl.	**Rigault de Genouilly**		1710	236	3	35	5	wood and iron topsides	17	0	1	2050	8 14-c.m. 3-ton B.L.R., 2 M.	..	1876	..	14·49	..	..
cr.	**Roland**		2300	249	4	38	0	,,	17	7	1	2700	15 14-c.m. 3-ton B.L.R., 6 M.	..	1882	..	14·50	..	..
g.v.	**Sagittaire**		490	148	4	23	10	,,	10	5	1	427	2 14-c.m. B.L.R., 2 10-c.m. do.	..	1881	..	11·05	..	..
to.g.b.	**Sainte Barbe**		320	196	10	21	7	steel	5	11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·00	..	..
,,	**Salve**		320	196	10	21	7	,,	5	11	2	1800	3 3-inch Q.F., 3 M.	2 f. tu. or l.car	1886	..	18·00	..	..
cr.	**Sané**		1900	255	0	36	0	wood	18	4	1	1998	6 14-c.m. 3-ton B.L.R.	..	1870	..	15·02	..	..
g.v.	**Scorpion**		470	151	6	24	9	composite	10	6	1	450	2 14-c.m. 3-ton B.L.R., 2 10-c.m. do.	..	1883	..	11·00	..	..
sl.	**Segond**		1280	204	8	34	2	wood	15	10	1	894	6 14-c.m. 3-ton B.L.R., 2 M.	..	1869	..	11·26	..	..
cr.	**Seignelay**		1900	255	0	36	0	,,	18	4	1	1967	8 14-c.m. 3-ton B.L.R.	..	1874	..	15·00	..	..
fr.c.	**Sfax**	P.	4488	288	9	49	3	steel & wood	24	9	2	6034	6 16-c.m. 5-ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 5 M.	5 f. tu. or l.car	1884	200,000	16·84	800	..
g.v.	**Sirius**		473	142	0	24	9	wood	10	6	1	450	2 14-c.m. B.L.R., 2 10-c.m. do., 2 M.	..	Bldg.	..	..	..	..
cr.	**Suchet**	P.	3027	297	6	40	0	steel	17	6	2	9000	4 16-c.m. B.L.R., 4 Q.F., 6 M.	4 f. tu. or l.car	Bldg.	202,760	20·00	480	4000 at 12½ kts.
,,	**Surcouf**	P.	1850	312	0	30	5	,,	14	0	2	6000	2 14-c.m. 3-ton B.L.R., 3 Q.F., 4 M.	5 f. tu. or l.car	1888	131,200	19·50	200	2400
fr.cr.	**Tage**	P.	7045	390	0	53	8	,,	22	10	2	10,330	6 16-c.m. 5-ton B.L.R., 10 14-c.m. 3-ton do., 3 Q.F., 12 M.	7 f. tu. or l.car	1886	..	19·00	800	..

FRANCE.—Unarmoured Ships—*continued.*

cr., cruiser; *d.v.*, despatch vessel; *fr.c.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.cr.*, torpedo cruiser; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Dischargers for Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at ten knots.
		tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
sl.	**Talisman** (Requires repair) .	1410	224	9	33	6	wood	15	5	1	691	4 14-c.m. 3-ton B.L.R., 2 10-c.m. do., 2 M.	..	1862	..	11·28	..	..
fr.c.	**Tourville**	5600	333	5	50	3	iron & wood	25	4	1	7466	7 16-c.m. 5-ton B.L.R., 14 14-c.m. 3-ton do., 1 l.	..	1876	..	16·89	800	..
	Troude . . . P.	1877	311	6	31	2	steel	14	0	2	6000	2 14 c.m. 3-ton B.L.R., 7 M. . .	5 f. tu. or l.car	1888	..	19·50	200	2400
sl.	**Vaudreuil**	1280	204	8	34	1	wood	15	10	1	867	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1870	..	11·00	..	..
to.cr.	**Vautour**	1280	216	6	29	3	steel	15	5	2	3200	5 10-c.m. B.L.R., 6 M. . . .	5 f. tu. or l.car	1886	80,000	17·50	..	..
fr.c.	**Vénus**	2800	246	9	42	8	wood	21	4	1	1308	16 14-c.m. B.L.R., 6 M. . .	..	1864	..	12·57	..	..
cr.	**Villars**	2400	249	4	38	0	wood & iron	17	7	1	2380	15 14-c.m. 3-ton B.L.R., 6 M. .	..	1879	..	14·25	..	..
g.v.	**Vipère**	490	145	4	23	10	composite	10	6	1	427	2 14-c.m. B.L.R., 2 10-c.m. do. .	..	1881	..	10·30	..	..
d.v.	**Volage**	510	160	5	28	3	wood	11	9	1	401	2 9-c.m. B.L.R., 4 M. . . .	..	1881	..	10·76	..	..
sl.	**Volta** (Requires repair) .	1350	207	8	33	9	"	15	7	1	1066	6 14-c.m. 3-ton B.L.R., 2 M. . .	..	1867	..	12·94	..	..
d.v.	**Voltigeur**	910	199	5	28	5	wood & iron	12	7	1	850	4 14-c.m. 3-ton B.L.R. . . .	..	1878	..	12·48	..	..
tr.cr.	**Wattignies**. . . .	1310	230	0	29	6	steel	15	0	2	4000	5 10-c.m. B.L.R., 2 6½-c.m. do., 4 Q.F.	..	Bldg.	116,760	18·0	..	..

Besides transports, of which there is a large number, store ships, surveying vessels, training ships, yachts, sailing vessels, &c., there are, on the List of the French Navy, the following:—

River and local (screw) despatch vessels (Avisos de flotille).—Actif, Chimère, Corse, Cuvier, Élan, Ibis, Loyalty, Mouette. 240 to 410 tons; 205 to 417 I.H.P.

River and local (paddle) despatch vessels (Avisos de flotille).—Albatros, Alcyon, Alouette, Ardent, Basilic, Bengali, Brandon, Cigale, Cigogne, Écureuil, Goëland, Gogah, Héron, Jouffroy, Lézard, Magicien, Mesange, Oyap-ock, Pétrel, Pingouin, Pluvier, Rapide, Salamandre, Travailleur, Vigilant.

River (screw) gunboats (Chaloupes canonnières).—Alerte, Arquebuse, Avalanche, Bäionette, Bouclier, Bourrasque, Carabine, Caronade Casse-tête Cimeterre, Épée, Escopette, Estoc, Flamberge, Framée, Glaive, Hache, Harpon, Javeline, Javelot, Massue, Mitrailleuse, Mousqueton, Mutine, Oluma (building for the Congo), Perrier, Rafale, Redoute, Revolver, Sagaie, Tirailleuse, Tromblon, Yatagan.

River (paddle) gunboats (Chaloupes canonnières).—Berthe-de-Villars, Biche, Bobillot, Bossant, Chamois, Cuvellier, Doucet, Éclair, Garnier, Henry-Rivière, Jacquin, Levrard, Moulun, Pionnier, Raynaud, Rollandes, Trombe.

Torpedo boats, built and building:—

First Class.

Fourteen above 130 feet in length, from 65 to 148 tons displacement, from 20 to 24 knots speed, and armed with 2 to 4 launching tubes, and 2 to 4 machine guns.

Fifteen new first class boats are in progress, and will be completed by January 1, 1891.

Thirty others were provided for by a supplementary grant of July, 1889, two being of the Coureur type, to be built by the Forges et Chantiers de la Méditerranée

Seventy of 100 to 130 feet in length, 43 to 54 tons displacement, 19 to 21 knots speed, and all armed with two bow tubes.

Forty-one of 80 to 100 feet in length, 26 to 35 tons displacement, 17 to 20 knots speed. A few are armed with spar torpedoes, and the others with two bow tubes each. Total 124.

Second Class.

Seven of 60 to 80 feet long, one of 11 to 15 tons displacement, and 14 to 16 knots speed. Four are fitted with launching apparatus, two with side frames, and one with the spar torpedo.

GERMANY.—Armoured Ships.

a.g.b., armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *t.*, turret ship; *c.d.*, coast defence ship; **f. tu., l. car.**, fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt or Citadel.	Armour. Battery or Breastwork.	Backing.	Draught of Water.	Propellers.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
br. c.d.	**Arminius** . . (iron)	1583	197 4	36 0	4½	7¼ turret	9	13 10	1	1200	4 21-c.m. 10-ton B.L.R. . . .	..	1864	92,512	10·50	200	..
b.	**Baden** . . . (iron)	7400	298 0	60 0	16	10 on barbette	8	19 8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	..	1880	444,886	14·00	700	..
a.g.b. c.d.	**Basilisk** . . (iron)	1109	143 0	35 6	8	8 turret	8	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1878	58,042	9·00	40	..
b.	**Bayern** . . (iron)	7400	298 0	60 0	16	10 barbette	8	19 8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	..	1878	406,660	14·00	700	..
a.g.b. c.d.	**Biene** . . . (iron)	1109	143 0	35 6	8	8 turret	8	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1876	62,853	9·00	40	..
"	**Camäleon** . . (iron)	1109	143 0	35 6	8	8 turret	8	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1878	57,564	9·00	40	..
"	**Crocodil** . . (iron)	1109	143 0	35 6	8	8 turret	8	10 2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1879	57,237	9·00	40	..
c.b.	**Deutschland** . (iron)	7676	280 0	62 4	10	8	10	24 7	1	8000	8 26-c.m. 22-ton B.L.R., 1 21-c.m. 13-ton do., 2 15-c.m. 4-ton do., 6 M., 4 l.	5 f. tu. or l.car	1874	412,022	14·5	710	3400
"	**Friedrich Carl** . (iron)	6007	300 0	54 6	5	4½	15	23 11	1	3500	16 21-c.m. B.L.R., 6 M., 4 l. . . .	..	1867	322,663	13·60	672	1550
t.	**Friedrich der Grosse** . (iron)	6770	307 0	53 6	9¼	8 breastwork, 10 turret	8¼	24 7	1	4930	4 26-c.m. 18-ton Krupp B.L.R., 2 17-c.m. 6-ton do., 6 M., 4 l.	..	1874	365,170	14·00	550	2500
c.b.	**Hansa** . . .(wood)	3610	235 2	45 0	6	6 to 4½	12½	21 8	1	2442	8 21-c.m. 9-ton B.L.R., 6 M., 4 l.	..	1872	183,270	12·00	300	..
a.g.b. c.d.	**Hummel** . . (iron)	1109	143 0	35 6	8	8 turret	8	10 2	1	700	1 30½-c.m. 35-ton B.L.R., 2 M. . .	1 f. tu.	1881	56,741	9·00	40	..
c.b.	**Kaiser** . . . (iron)	7676	280 0	62 4	10	8	10	24 7	1	7803	8 26-c.m. 23-ton B.L.R., 7 15-c.m. 4-ton do., 6 M., 4 l.	5 f. tu. or l.car	1874	411,301	14·60	710	3400

br.	**König Wilhelm**	(iron)	9567	355 0	60 0	8	7	10	26	7	1	8350	18 24-c.m. 14½-ton B.L.R., 4 21-c.m. 13-ton do., 6 15-c.m. 4-ton do., 6 M., 4 l.	..	1868	505,141	14·70	700	1740
b.	4 new ships .	(steel)	10000	355 0	69 0	13¾	13¾	..	26	3	2	15000	3 28-ton B.L.G., 8 15-c.m. do., 14 Q.F.	..	Bldg.	475,000	18.0	..	..
c.b.	**Kronprinz** .	(iron)	5568	286 0	50 0	5	4½	16	24	3	1	4800	1 21-c.m. 12-ton B.L.R., 15 21-c.m. 9 ton do., 6 M., 4 l.	..	1867	314,836	14·30	650	..
a.g.b. c.d.	**Mücke** . .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1877	60,960	9·00	40	..
"	**Natter** . .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1880	52,822	9·00	40	..
b.	**Oldenburg** .	(steel)	5200	246 0	59 0	13 (compound)	8 compound	..	19	6	2	3900	8 24-c.m. 18-ton Krupp B.L.R., 4 15-c.m. 4-ton do., 6 M., 4 l.	4 f. tu. or l. car	1884	235,342	13·5	250	..
t.	**Preussen** .	(iron)	6770	308 6	53 6	9	8 breast-work 10 turret	8	24	7	1	4383	4 26-c.m. 18-ton Krupp B.L.R., 2 17-c.m. do., 6 M., 4 l.	..	1873	351,904	14·00	550	2500
b.	**Sachsen** .	(iron)	7400	298 0	60 0	16	10 barbette	8	19	8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	..	1877	422,178	14·00	700	..
a.g.b. c.d.	**Salamander** .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1880	56,914	9·00	40	..
"	**Scorpion** .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1877	60,796	9·00	40	..
a.c.	**Singfried** .	(steel)	3495	240 0	49 3	9½	..	..	17	9	2	4800	3 24-c.m. 19-ton B.L.R. . . .	3 f. tu. or l. car	1889	175,000	18·0	..	..
"	2 not named .	(steel)	3495	240 0	49 3	9½	..	..	17	9	..	4800	3 24-c.m. 19-ton B.L.R. . . .	3 f. tu. or l. car	Bldg.	175,000	18·0	..	..
a.g.b. c.d.	**Viper** . .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1876	61,463	9·00	40	400 at 9 knots
"	**Wespe** . .	(iron)	1109	143 0	35 6	8	8 turret	8	10	2	2	700	1 30½-c.m. 35-ton B.L.R., 2 M. .	1 f. tu.	1876	53,771	9·0	40	360 at 9 knots
b.	**Wurttemberg**	(iron)	7400	298 0	60 0	16	10 barbette	8	19	8	2	5600	6 26-c.m. 18-ton Krupp B.L.R., 6 M., 4 l.	..	1878	402,512	14·00	700	..

For new Programme of armoured ships to be built, see Chap. XI. of Part I., p. 122.

GERMANY.—Unarmoured Ships.

corv., corvette; *d.v.*, despatch vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.r.*, torpedo ram; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.		Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at ten knots.
			tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Adler**		884	177 2	32 10	composite	11 6	1	724	2 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do.	..	1883	44,047	11·00	..	..
"	**Albatross**		716	168 0	26 10	wood	10 6	1	496	2 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do.	..	1871	38,092	10·00	..	..
corv.	**Alexandrine**		2373	236 3	42 7	iron, steel, and wood	18 4	1	2400	12 15-c.m. 4-ton B.L.R., 2 8·7 c.-m. 9-cwt. do., 4 M, 1 l.	1 f. tu. or l.car	1885	102,877	15·00	..	..
"	**Arcona**		2373	236 3	42 7	"	18 4	1	2400	12 15-c.m. 4-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M., 1 l.	1 f. tu. or l.car	1885	109,875	15·00	..	..
"	5 New ships	P.	5500	328 0	49 3	steel	23 0	2	12,000	2 24-c.m. B.L.R., 8 15-c.m. do., Q.F.	..	Bldg.	..	20·0	..	..
"	**Ariadne** (School ship)		1727	204 0	35 0	wood	17 4	1	2100	6 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1871	91,979	13·00	..	..
fr. cr.	**Bismarck**		2856	244 4	44 10	iron and wood	19 8	1	2529	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l.	1 f. tu. or l.car	1877	136,055	13·00	..	..
d.v.	**Blitz**		1382	246 0	32 10	steel	13 5	2	2839	1 12½-c.m. 28-cwt. B.L.R., 4 8·7-c.m. 9-cwt. do., 4 M.	1 f. tu. or l.car	1882	66,935	16·00	..	..
fr.cr.	**Blucher***		2856	244 4	44 10	iron & wood	19 8	1	2990	16 15-c.m. B.L.R., 6 M.. 2 l.	6 f. tu. or l.car	1877	136,408	14·00	..	..
to.r.	**Bremse**	P.	866	203 5	27 10	steel	10 6	..	1500	1 21-c.m. 9-ton B.L.R.	..	1884	49,308	15·00	65	..
"	**Brummer**	P.	866	203 5	27 10	steel	10 6	..	1500	1 21-c.m. 9-ton B.L.R.	..	1884	52,422	15·00	65	..
corv.	**Carola.**		2169	226 4	42 7	iron and wood	18 4	1	2340	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M., 1 l.	..	1880	109,617	14·00	..	2000
fr.cr.	**Charlotte**		3360	244 6	45 0	iron & wood	18 6	1	3000	18 15-c.m. 4-ton B.L.R., 6 M., 2 l.	1 f. tu. or l.car	1885	..	16·00	..	..
[illegible]	**Eber**		570	152 6	26 8	composite	10 4	..	..	3 12½-c.m. 27-cwt. B.L.R.	..	1887	..	12·00	..	..

corv.	**Freya**		2017	259	2	35	0	„	17	4	1	2471	8 15-c.m. 3½-ton B.L.R., 4 M., 1 l. .	..	1874	106,868	15·00	..	..
„	**Germania** . . .	P.	~~4300~~	339	6	46	0	steel	..		2	8000	14 15-c.m. B.L.R.	f. tu. or l.car	Bldg.	220,000 without arm't	18·0	900	..
fr.cr.	**Gneisenau**		2856	244	4	44	10	iron and wood	19	8	1	2500	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1879	154,445	13·00	..	..
d.v.	**Greif**		2000	318	0	32	0	steel	13	0	2	5400	2 10½-c.m. 23-cwt. B.L.R., 10 M.. .	..	1886	..	19·00	..	..
„	**Grille**		350	170	6	24	3	wood	10	0	1	650	1 12½-c.m. 28-cwt. B.L.R., 2 8-c.m. do.	..	1857	..	13·00	..	..
g.v.	**Habicht**		848	174	0	29	6	composite	11	5	1	875	1 15-c.m. 3½-ton B.L.R., 4 12-c.m. 27-cwt. do., 4 8·7-c.m. do.	..	1879	33,051	12·00	..	..
„	**Hyäne**.		489	139	8	25	1	iron	9	10	1	340	2 10½-c.m. B.L.R., 2 l.	..	1878	24,340	9·00	..	..
„	**Iltis**		489	139	8	25	1	„	9	10	1	380	2 10½-c.m. B.L.R., 2 l.	..	1878	27,480	9·00	..	..
cr.	**Irene**	P.	4300	339	6	46	0	steel	21	0	2	8000	14 15-c.m. B.L.R.	1 f. tu. l. car.	1887	220,000 without arm't	18·0	900	..
d.v.	**Jagd**		1240	275	6	31	6	steel	13	9	2	4000	3 10½-c.m. 23-cwt. B.L.R., 10 M.. .	..	1888	..	19·0	..	..
fr.cr.	**Leipzig**		3925	282	2	45	8	iron and wood	21	7	1	3590	2 17-c.m. 5½-ton B.L.R., 10 17-c.m. 3½-ton. 6 M., 2 l.	..	1875	203,055	14·00	..	4000
corv.	**Luise** (School ship) . .		1719	204	0	35	0	wood	17	4	1	2100	6 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1872	85,975	13·00	..	..
„	**Marie**		2169	226	4	42	7	iron & wood	18	4	1	2257	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M., 1 l.	1 f. tu. or l.car	1881	..	13·50	..	2000
d.v.	**Meteor**		780	262	6	29	6	steel	11	6	2	5000	4 8-c.m. B.L.R., 7 Q.F., 2 M. . . .	..	1890	..	23·0	..	..
fr.cr.	**Moltke**		2856	244	4	44	10	„	19	8	1	2500	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l. .	1 f. tu. or l.car	1877	140,705	13·50	..	..
g.v.	**Möwe**		848	174	0	29	6	composite	11	5	1	784	1 15-c.m. 3½-ton B.L.R., 4 12-c.m. 27-cwt. do., 4 8·7-c.m. 9-cwt. do	..	1879	33,390	12·00	..	..
„	**Nautilus**		716	168	0	26	10	wood	10	6	1	496	2 15-c.m. 3½-ton B.L.R., 2 12-c.m. 27-cwt. do.	..	1871	38,147	10·00	..	..
corv.	**Olga**		2169	226	4	42	7	iron & wood (sheathed)	18	4	1	2397	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9-cwt. do., 4 M., 1 l.	..	1880	113,812	14·00	..	2000
d.v.	**Pfeil**		1382	246	0	32	10	steel	13	5	2	2700	1 12½-c.m. 28-cwt. B.L.R., 4 8·7-c.m. 9-cwt. do., 4 M.	1 f. tu.	1882	73,605	15·00	..	..
cr.	**Prinzess Wilhelm** .	P.	4300	339	6	46	0	„	..		2	8000	14 15-c.m. B.L.R.	1 f. tu. 1 l. car.	1887	220,000 without arm't	18·0	900	..
fr.cr.	**Prinz Adalbert** . . .		3925	282	2	45	8	iron & wood	21	7	1	3612	2 17-c.m. 5½-ton B.L.R., 10 17-c.m. 3½-ton do., 6 M., 2 l.	..	1876	206,499	15.00	..	..

GERMANY.—Unarmoured Ships—*continued.*

corv., corvette; *d.v.*, despatch vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.r.*, torpedo ram; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
g.v.	**Schwalbe**	1300	203	0	30	6	composite	12	4	2	1500	8 10½-c.m. 22½-cwt. B.L.R. Krupp, 4 M.	..	1887	..	13·50	..	..
corv.	**Sophie**	2169	226	4	42	7	iron & wood	18	4	1	2100	8 15-c.m. 3½-ton B.L.R., 2 8·7-c.m. 9 cwt. do., 4 M., 1 l.	..	1881	117,155	14·00	..	2000
g.v.	**Sperber**	1300	236	0	29	8	composite	12	6	2	1500	8 10½-c.m. 22½-cwt. B.L.R., 4 M.	..	1888	..	13·5	..	..
fr.cr.	**Stein**	2856	244	4	44	10	"	19	8	1	2707	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l.	1 f. tu. or l.car	1879	136,069	14·00	..	..
"	**Stosch**	2856	244	4	44	10	"	19	8	1	2581	16 15-c.m. 3½-ton B.L.R., 6 M., 2 l.	1 f. tu. or l.car	1877	126,066	13·00	..	..
corv.	**Victoria**	1825	235	9	35	4	wood	17	8	1	1300	4 15-c.m. 3½-ton B.L.R., 6 12-c.m. 27-cwt. do., 4 M., 1 l.	..	1864	84,450	13·00	..	..
d.v.	**Wacht**	1240	275	6	31	6	steel	13	9	2	4000	3 10½-c.m. 23 cwt. B.L.R., 10 M.	..	1887	..	20·0	..	..
g.v.	**Wolf**	489	139	8	25	1	iron	9	10	1	340	2 10½-c.m. 23-cwt. B.L.R., 2 l.	..	1878	24,343	9·00	..	..
d.v.	**Zieten**	975	196	10	29	6	"	11	6	1	2323	4 12-c.m. 27 cwt. B.L.R., 4 M.	..	1876	81,755	16·00	140	..
	4 Torpedo Gunboats	350	186	0	21	5	steel	..		2	2000	6 M.	..	'89–90	..	21·00	..	..
	4 Torpedo Gunboats	320	..	..	..		steel	..		2	..	6 M.	..	'88–89	..	22·0	..	..

There are, also, on the German list, besides stationary, surveying, harbour vessels and yachts, the following:—

One steam gunnery ship.—Mars of 3333 tons displacement, and 2000 I.HP.

Two steam gunnery tenders.

One steam torpedo tender (Ulan).

One steam gunboat (Dracke).

One steam training ship—Nixe.

Eight small torpedo vessels; 50 to 140 tons, 500 to 550 I.HP.

TORPEDO BOATS.

First-class, built and building, 94 of 65 to 85 tons and 18 to 22 knots speed, armament, 2 launching tubes; 2 machine guns; and 13 second-class boats.

GREECE.—Armoured Ships.

t., turret ship; *br.*, broadside ship; *c.b.*, central-battery ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour.		Backing.	Mean Draught of Water.		Propeller.	Indicated Horse power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
							Belt.	Battery.						Guns.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	inches.	inches.	ins.	ft.	in.						£	knots.	tons.	
t.	**Hydra** . (steel)	4885	334	0	51	10	12	$13\frac{3}{4}$	..	18	0	2	6700	3 27-c.m. B.L.R., 5 15-c.m. do., 7 6-pdr. Q.F., 16 M., 2 l.	3 l. car	1889	..	17·00	..	..
c.b.	**King George** (iron)	1774	200	2	32	10	7	6	..	15	6	2	2400	2 21-c.m. 10-ton B.L.R. (Krupp), 2 M., 4 l. .	..	1867	..	12·00	210	..
br.	**Olga** . (wood)	2060	230	0	59	0	$4\frac{3}{4}$	4	..	18	0	1	1950	4 17-c.m. $5\frac{1}{2}$-ton B.L.R. (long Krupp), 2 17-c.m. $3\frac{1}{2}$-ton do. (short), 2 M., 4 l.	..	1869	..	10·00	240	..
t.	**Psara** . .	4885	334	0	51	10	12	$13\frac{3}{4}$	..	18	0	2	6700	3 27-c.m. B.L.R., 5 15-c.m. do., 7 6-pdr. Q.F., 16 M.	3 l. car	Bldg.	..	17·0	..	..
t.	**Spetsia** . .	4885	334	0	51	10	12	$13\frac{3}{4}$	..	18	0	2	6700	2 27-c.m. B.L.R., 5 15-c.m. do., 7 6-pdr. Q.F., 16 M., 2 l.	3 l. car	1889	..	17·0	..	..

GREECE.—Unarmoured Ships.

cr., cruiser; *corv.*, corvette; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; **f. tu.**, **l. car.**, **fixed tube or launching carriage for discharging Fish torpedoes.**

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	
g.v.	**Acheloos**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M. . .	..	1884	..	10·00	50	..
corv.	**Admiral Miaulis** .	1800	246 0	36 0	iron and wood	14 5	1	2200	3 17-c.m. B.L.R. 5½-ton (long Krupp), 1 17-c.m. 3½-ton do. (short), 2 M., 4 l.	..	1879	..	15·00	220	..
g.v.	**Alpheos**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M. . .	..	1884	..	10·00	50	..
„	**Aphroessa** . .	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp) . . .	..	1858	..	9·00	30	..
„	**Eurotas**	420	138 0	24 11	steel	11 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M. . .	..	1884	..	10·00	50	..
fr.cr.	**Hellas**	1300	200 2	37 0	wood	19 4	1	1500	12 15-c.m. B.L.R. (Krupp), 2 M. . .	..	1878 (repaired)	..	11·00	230	..
g.v.	**Hydra**	440	124 8	29 6	steel & wood	9 6	2	380	1 26-c.m. 26-ton B.L.R. (Krupp), 2 M. .	..	1881	..	10.00	60	..
cr.	**Mecali** (was Buzzard) .	1000	210 6	32 6	steel	..	2	1000	.. ..	..	1880	..	..	..	..
g.v.	**Nauplion** . . .	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp) . . .	..	1856	..	9·00	30	..
„	**Paralos**	380	123 0	23 11	„	9 10	1	204	1 8·7-c.m. B.L.R. (Krupp), 1 M. . .	..	1858	..	8·00	60	..
„	**Peneus**	420	138 0	24 11	steel	12 6	1	400	2 9·6-c.m. B.L.R. (Krupp), 3 M. . .	..	1884	..	10·55	50	..
„	**Plixiavra**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp) . . .	..	1856	..	9·00	55	..
cr.	**Salamina**	380	123 0	23 11	„	9 10	1	200	1 8·7-c.m. B.L.R. (Krupp), 1 M. . .	..	1858	..	8·00	60	..
„	**Sfaktirea** (was Eldorado)	1000	235 0	30 0	steel	13 0	1	1700	.. ..	..	1885	..	14·50	100	..
g.v.	**Spetsai**	440	124 8	29 6	steel & wood	9 6	2	680	1 26-c.m. 26-ton B.L.R. (Krupp), 2 M. .	..	1881	..	11·30	50	..
„	**Syros**	380	124 7	22 11	iron	9 10	1	160	1 8·7-c.m. B.L.R. (Krupp) . . .	..	..	..	9·00	18	..

Torpedo depôt ship.—Psara, 1100 tons, 500 I.H.P., 2 10-c.m. B.L.R. (Krupp) guns, 2 Whitehead torpedo-launching guns, one port on each broadside, 2 under-water torpedo tubes ahead. 14 knots speed.

Torpedo boats.—32 of several classes, 6 being sea-going, of 128 ft. long, 15 ft. 3 in. broad, of 85 tons displacement, 1000 horse-power, and 19 knots speed, built at Stettin; and 6 other first class boats, built by Yarrow, of about 100 ft. in length, of 46 tons displacement, and 620 horse-power and 20 knots speed; 19 of 21 to 35 tons displacement, and 20 smaller steam-boats for torpedo purposes.

There are also four small iron steamers fitted for spar torpedoes; and five small composite custom-house steamers, also a paddle yacht and a screw transport—the Bosbulina—of 1170 tons displacement, and 1800 horse-power.

HAYTI.

(The Republic of Hayti has unarmoured ships only.) *corv.*, corvette; *g.v.*, gun-vessel; *sl.*, sloop.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean draught of water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**22nd December**	900	208 0	29 11	iron	16 0	1	360	4 40-pdr. (Armstrong)	..	1860	..	9·00	..	..
corv.	**Dessalines**	..	185 0	32 0	„	14 9	1	190 (nominal)	1 7-in., 2 30-pdr., 4 34-pdr.	..	1883	..	16·00	..	..
sl.	**St. Michael**	850	162 0	33 0	„	11 0	1	120 (nominal)	1 11-in. smoothbore, 8 30-pdr.	..	1875	..	12·00	..	..
„	**1804**	600	145 0	29 0	„	10 0	1	100 (nominal)	1 10-in. smoothbore, 6 30-pdr.	..	1875	..	12·00	..	..
„	**Toussaint L'ouverture**	500	164 0	24 6	steel	9 6	1	800	1 6¼-in. B.L.R., 2 4¾-in. do., 2 M.	..	1886	..	12·00	120	3000

ITALY.—Armoured Ships.

***a.g.b.*, armoured gunboat; *b.*, barbette ship; *c.b.*, central-battery ship; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.**

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Belt.	Armour. Citadel or Turret.	Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Whitehead Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	ins.	ft.	in.						£	knots.	tons.	knots.
t.	Affondatore . .(iron)	4376	290	0	40	0	5	5 turret	9	20	0	1	3240	2 25-c.m. 28-ton B.L.R. (Armstrong), 4 12-c.m. do., 6 M.	4 l. car.	1865	152,480	12·00	460	1647
c.b.	Ancona . . .(iron)	4250	256	0	50	0	4½	4½	13¾	25	0	1	2548	6 15-c.m. B.L.R., 6 12-c.m. do. 6 M. .	2 l. car.	1864	172,000	11·2	485	2000
b.	Andrea Doria (steel)	11,000	328	2	65	4	18 comp.	18 comp.	..	27	2	2	10,000	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., 4 12-c.m. do., 12 M.	5 f. tu. or l. car (2 sub)	1885	..	16·00	850	4500
c.b.	Castelfidardo . .(iron)	4250	256	0	50	0	4½	4½	13¾	21	11	1	2125	8 15-c.m. B.L.R., 6 12-c.m. do., 6 20-c.m. 7-ton do., 6 M.	2 l. car.	1863	..	12·00	485	2600
t.	Dandolo . (iron and steel)	11,202	340	11	64	9	21½	18 turret	22¾	26	7	2	7500	4 45-c.m. 100-ton M.L.R. (Armstrong), 3 12-c.m. B.L.R., 12 M., 2 l.	3 f. tu. or l. car	1878	700,000	15·60	1000	3760
„	Duilio . (iron and steel)	11,138	340	11	64	9	21½	18 turret	22¾	26	7	2	7500	4 45-c.m. 100-ton M.L.R. (Armstrong), 3 12-c.m. B.L.R., 12 M., 2 l.	3 f. tu. or l. car	1876	..	15·00	1000	3760
c.b.	Formidabile . .(iron)	2725	216	0	45	10	4½	4½ battery	9	18	0	1	1100	4 20-c.m. 7-ton M.L.R. (Armstrong), 2 15-c.m. B.L.R., 5 12-c.m. do., 4 M.	..	1861	118,000	11·00	310	..
b.	Francesco Morosini (steel)	11,000	328	2	65	4	18 comp.	18 comp.	..	27	2	2	10,000	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., do. 14 M.	5 f. tu. or l. car (2 sub)	1885	..	16·00	850	4500
„	Italia . . (steel)	13,851	400	6	74	0	16-inch funnel op'nings	19 comp.	22¾	31	2	2	18,000	4 43-c.m. 100-ton B.L.R. (Armstrong), 8 15-c.m. 4-ton do., 14 M.	4 f. tu. or l. car	1880	..	18·00	1650	8900

,,	Lepanto .	(steel)	13,550	400	6	74	0	16-inch funnel op'nings	19 comp.	22¾	31	2	2	18,000	4 43-c.m. 100-ton B.L.R. (Armstrong), 8 15-c.m. 4-ton do., 14 M., 4 l.	4 f. tu. or l. car	1883	..	18·38	1650	900
c.b.	Maria Pia .	(iron)	4268	256	0	49	4	4½	4½	13¾	22	7	1	2924	8 15-c.m. B.L.R., 6 12-c.m. do. . .	2 f. tu. or l.car	1863	..	12·00	485	2600
2 batteries	Palestro . .	(wood)	6419	265	0	57	10	8¾	6	24	26	11	1	3496	1 28-c.m. 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l.car	1873	..	13·00	513	1780
,,	Principe Amedeo	(wood)	5814	265	0	57	9	8¾	6	24	26	6	1	3413	1 28-c.m. 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l.car	1872	..	13·00	513	1780
b.	Re Umberto	(steel)	13,251	400	0	76	9	..	18 barbettes	..	28	6	2	19,500	4 34-c.m. 67-ton B.L.R. (Armstrong), 8 15-c.m. do., 16 12-c.m. do., 10 Q.F. and M.	6 f. tu. or l.car	1888	1,000,000	18·00	1200	..
c.b.	Roma . .	(wood)	5814	262	6	58	6	4½	4½ battery	26	25	3	1	3000	9 22-c.m. 13-ton M.L.R., (Armstrong), 6 M., 6 l.	2 l. car.	1865	..	13·00	511	1940
b.	Ruggiero di Lauria .	(steel)	11,000	328	2	65	4	18 comp.	18 comp. barbettes	..	27	2	2	10,000	4 43-c.m. 105-ton B.L.R. (Armstrong), 2 15-c.m. do., 4 12 c.m. do., 12 M.	5 f. tu. or l. car (2 sub)	1884	..	17·5	850	4500
c.b.	San Martino .	(iron)	4268	256	0	49	4	4½	4½	14	22	7	1	2620	8 15-c.m. B.L.R., 6 12-c.m. do., 6 M. .	2 f. tu. or l.car	1863	..	12·00	490	..
b.	Sardegna .	(steel)	13,251	400	0	76	9	..	18 comp. barbettes	..	28	6	2	22,800	4 34-c.m. 67-ton B.L.R. (Armstrong), 8 15-c.m. do., 6 12-c.m. do., 10 Q.F. and M.	7 f. tu. or l.car	Bldg.	1,000,000	19·00	1200	..
,,	Sicilia . .	(steel)	13,251	400	0	76	9	..	18 comp. barbettes	..	28	6	2	19,500	4 34-c.m. 104-ton B.L.R. (Armstrong), 8 15-c.m. do., 16 12-c.m. do., 10 Q.F. and M.	7 f. tu. or l.car	Bldg.	1,000,000	18·00	1200	..
,,	C—New ship (not named) (Similar to the Sicilia).		14,000	..		..		..	..	..	..	..		..	..	..	To be laid down	..	..	..	..
c.b.	Terribile . .	(iron)	2725	210	0	45	11	4½	4½ battery	9	18	0	1	1100	8 20-c.m. 7-ton M.L.R. (Armstrong), 4 m., 6 l.	..	1861	112,454	11·00	310	..
,,	Varese . .	(iron)	2220	200	0	42	7	4½	4½ battery	9	15	9	2	977	4 20-c.m. 7-ton M.L.R. (Armstrong), 1 16-c.m. M.L.R., 4 M., 6 l.	..	1865	85,000	10·00	180	..

For Programme of new armoured ships see Chap. XI.

ITALY.—Unarmoured Ships.

corv., corvette; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *fr.cr.*, frigate-built cruiser; *to.g.b.*, torpedo gun boat; *to.cr.*, torpedo cruiser; *to.r.cr.*, torpedo-ram cruiser; *to.s.*, torpedo ship; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.		Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	**Agostino Barbarigo**		656	216 6	23 11	steel	10 10	1	1700	5 57-m.m. Q.F., 2 M.	..	1879	..	15·50	210	1000
corv.	**Amerigo Vespucci**	P.	2533	255 11	42 7	"	17 0	1	5000	8 15-c.m. 4-ton B.L.R., 6 M., 3 l.	2 l. car.	1882	..	15·00	500	..
g.v.	**Andrea Provana**		649	167 4	26 3	"	10 2	1	1000	4 12-c.m. B.L.R., 2 M.	..	1884	..	13·00	120	..
d.v.	**Archimede**		770	230 0	26 3	"	10 0	1	1700	4 12-c.m. B.L.R., 4 M.	2 l. car	1887	..	16·00	210	..
to.cr.	**Aretusa**		740	230 0	25 6	"	11 9	3	4200	4 6-pdr. and 2 3-pdr. Q.F., 3 M.	5 f. tu. or l. car	Bldg.	..	20	180	..
corv.	**Caracciolo** (Training ship)		1650	209 11	36 0	wood	16 5	1	973	6 16-c.m. 5-ton M.L.R., 4 M.	..	1869	..	10·00	180	..
g.v.	**Cariddi**		1050	177 2	28 6	"	12 5	1	956	1 16-c.m., 2 12-c.m. B.L.R., 4 M.	..	1875	..	10·00	164	..
"	**Castore**		..	..	..	..	..	..	..	.. ..	..	..	..	..	..	..
to.cr.	**Confienza**		740	230 0	25 6	steel	9 0	3	3600	1 12 c.m. B.L.R., 4 6-pdr., and 2 3-pr. Q.F.G., 3 M.	2 f. tu. or l. car	1887	..	20·00	180	..
corv.	**Cristoforo Colombo**		2362	249 4	36 0	wood	17 4	1	3782	8 12-c.m. B.L.R., 4 M.	..	1875	..	14·00	·471	3600
g.v.	**Curtatone**		1040	177 3	32 8	steel	13 6	1	1100	6 5-inch B.L.R.	..	1887	..	12·00	197	..
cr.	**Dogali**	P.	2020	250 0	37 0	"	14 6	2	7600	6 6-inch B.L.R. (Armstrong), 9 Q.F., 6 M.	3 l. car	1887	170,000	19·66	480	..
"	Two cruisers Dogali type	P.	..	..	..	..	..	..	..	.. ..	approved to be built			..	..	..
to.r.cr.	**Etna**	P.	3530	282 2	42 7	steel	19 0	2	6000	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 4-ton do., 6 Q.F., 2 M.	4 f. tu. or l. car	1885	64,000 (engines)	17·00	630	..
c.r.	**Etruria**	P.	2280	262 6	39 6	"	16 7	2	6500	6 6-in. 5-ton B.L.R., 4 7-in. do.	..	Bldg.	..	18·50	400	..
d.v.	**Faadi Bruno**		840	137 6	32 9	"	..	1	800	.. ..	..	Bldg.	..	20·0	..	..
cr.	**Fieramosca**	P.	3745	290 0	43 6	"	19 4	2	7700	2 25-c.m. 25-ton B.L.R., 6 6-inch 4-ton B.L.R.	4 f. tu. or l. car	1888	..	17·00	590	..
corv.	**Flavio Gioja**	P.	2533	255 11	42 7	"	17 0	1	5000	8 15-c.m. 4-ton B.L.R. (Armstrong), 6 M.	3 f. tu. or l. car	1881	..	15·00	500	..
to.g.b.	**Folgore**		317	187 0	19 8	"	6 7	2	2400	2 6-pr. and 2 3-pr. Q.F., 1 M.	3 l. car.	1886	..	20·00	60	..

d.v.	**Galileo**		770	230	0	26	3	„	8	2	1	1700	4 5-inch B.L.R., 4 M. . . .	2 l. car	1887	..	15·00	210	..
fr.cr.	**Garibaldi** (Hospital ship) .		3376	223	2	49	3	wood	20	11	1	1041	8 16-c.m. M.L.R., 4 M. (as war vessel) .	..	1860	..	9·00	330	..
cr.	**Giovanni Bausan** .	P.	3068	275	7	42	7	steel	18	4	2	6500	2 25-c.m. 24-ton B.L.R. (Armstrong), 6 15-c.m. 5-ton B.L.R., 4 M.	3 f. tu. or l.car (1 f. tu. sub.)	1883	160,000	17·00	600	5000
to.cr.	**Goito**		740	230	0	25	6	„	11	9	2	4200	4 6-pr. and 2 3-pr. Q.F., 3 M. . .	6 f. tu. or l.car	1887	..	20·00	180	..
cr.	**Liguria** . . .	P.	2280	262	6	39	6	„	16	7	2	6500	6 6-in. 5-ton B.L.R., 4 4·7-in. do. .	..	Bldg.	..	20·00	..	..
„	**Lombardia** . . .	P.	2280	262	6	39	6	„	16	7	2	6500	6 6-in. 5-ton B.L.R., 4 4·7-in. do. .	..	Bldg.	..	20·00	..	..
d.v.	**Marcantonio Colonna** .		656	216	6	23	11	„	10	10	1	1700	5 57-m.m. Q.F., 2 M.	..	1879	..	15·40	197	..
cr.	**Marco Polo** . .	P.	3500	283	0	43	0	„	19	0	2	7700	2 10-in. 28-ton B.L.R., 4 6-in. 4-ton do., 8 Q.F.	..	Bldg.	..	17·00	..	..
to.cr.	**Minerva**		740	230	0	25	6	„	11	9	3	4200	6 6-pr. and 2 3-in. Q.F., 3 M. . .	5 f. tu. or l.car	Bldg.	..	20·00	180	..
„	**Montebello** . . .		740	230	0	25	6	„	11	9	3	4200	6 6-pr. Q.F.G., 2 3-pr. do., 3 M. . .	5 f. tu. or l.car	1888	..	20·00	180	..
„	**Monzambano** . .		740	230	0	25	6	„	11	9	3	4200	6 6-pr. and 2 3-pr. Q.F., 3 M. . .	5 f. tu. or l.car	1888	..	20·00	180	..
„	**Partenope**		740	230	0	25	6	„	11	9	3	4200	6 6-pr. and 2 3-pr. Q.F., 3 M. . .	5 f. tu. or l.car	Bldg.	..	20·00	180	..
cr.	**Piemonte**	P.	2500	300	0	38	0	„	15	0	2	12,000	6 6-inch Q.F., 6 4¾-inch do., 10 6-pdr. do., 10 M. (4 being maxims)	3 f. tu.	1888	..	21·00	600	13,000
to.s.	**Pietro Micca** . . .		535	203	5	19	7	iron	10	6	1	972	2 M.	1 l. car.	1876	..	10·00	28	..
d.v.	**Rapido**		1568	262	5	30	6	„	12	6	1	1920	5 57-m.m. Q.F., 2 M.	..	1876	..	13·40	300	2560
to.g b.	**Saetta**		317	187	0	19	8	steel	6	7	1	2400	2 6-pr. Q.F., 2 3-pr. do., 2 M. . . .	..	1887	..	20·00	90	..
corv.	**Savoia**	P.	2850	275	6	42	7	„	17	0	1	5000	6 6-pr. Q.F., 4 M.	..	1883	..	15·00	500	..
g.v.	**Scilla**		1050	177	2	28	6	wood	12	5	1	826	2 12-c.m. B.L.R. (Armstrong), 1 16-c.m., 4 M.	..	1874	..	10·00	..	..
„	**Sebastiano Veniero** . .		649	167	4	26	3	steel	10	2	1	1000	4 12-c.m. B.L.R., 2 M.. . . .	..	1884	..	13·00	..	..
d.v.	**Stafetta**		1505	252	7	30	10	iron	13	2	1	1800	4 12-c.m. B.L.R., 2 M.. . . .	1 l. car.	1876	..	13·50	300	3300
tor.cr.	**Stromboli** . . .	P.	3530	282	2	42	7	steel	19	0	2	7700	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 4-ton do., 8 M.	4 f. tu. or l.car	1886	64,000 (Engines)	17·00	630	..
to.cr.	**Tripoli**		740	230	0	25	10	„	11	9	2	4200	4 6-pr. and 2 3-pr. Q.F., 3 M. . .	5 f. tu. or l.car	1886	..	20·00	180	..

Y

ITALY.—Unarmoured Ships.—*continued.*

corv., corvette; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *fr.cr.*, frigate-built cruiser; *to.g.b.*, torpedo gunboat; *to.cr.*, torpedo cruiser; *to.r.cr.*, torpedo-ram cruiser; *to.s.*, torpedo ship; P., deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.		Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	**Umbria**	P.	2280	262 6	39 6	steel	16 7	2	6500	6 6-in. 5-ton B.L.R., 4 4·7-in. do.	..	Bldg.	..	20·00	..	..
"	**Urania**		740	230 0	25 6	"	11 9	3	4200	4 6-in. and 4 3-in. Q.F., 3 M.	5 f. tu. or l.car	Bldg.	..	20·00	180	..
d.v.	**Vedetta**		827	183 9	26 11	iron	11 5	1	670	4 12-c.m. B.L.R., 6 M.	..	1866	..	11·00	137	..
tor.cr.	**Vesuvio**	P.	3530	282 2	42 7	steel	19 0	2	7700	2 25-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 4-ton B.L.R. 8 Q.F. and M., 2 l.	4 f. tu. or l.car	1886	64,000 (Engines)	17·00	590	..
d.v.	(Two Vessels not named) .		770	299 8	26 3	steel	8 2	1	1700	4 5-inch B.L.R.	..	Bldg. at Venice		15·00	210	..
fr.cr.	**Vettor Pisani** (Training ship)		1800	213 3	39 4	wood	17 0	1	1004	6 12-c.m. B.L.R., 4 M.	..	1869	..	9·00	190	..
g.v.	**Volturno**		1040	177 3	32 8	steel	13 6	1	1100	6 5-inch B.L.R.	..	1887	..	12·00	197	..

Besides the ships of which the names are given in the foregoing tables, Italy has

Gunboats (*Staunch class*).—Guardiano and Sentinella, of 265 tons, and of 231 and 260 I.HP. respectively; 6 small gunboats of 87 tons and 52 HP.; Castore and Poluca, of 530 tons, and 8 knots speed.

Paddle despatch vessels.—Esploratore, Messaggiero, of 1000 to 1200 tons, and 12 to 15 knots speed.

Also transports, one being the Eritreo (late the America), of 9550 tons displacement, and 18 knots speed; torpedo depôt ship Vulcano; surveying vessel, training ships, Maria Adelaide, of 3429 tons, and the Vittoria Emanuele of 3076 tons, harbour and coasting-service craft, &c.

Torpedo boats.—First class, 100 built and building; of these five of the Nibbio class are 152½ ft. long, 16 ft. 9 inches wide, about 140 tons displacement, and 23 knots speed; nine are 135 ft. long, 14 ft. wide, displacement 110 tons, and 22·5 knots speed; 84 of 100 to 130 ft. long, and of 85 tons to 32 tons displacement, and 20 to 22½ knots speed; and the two others from 80 to 100 ft. long, of 32 tons displacement, and 21 knots speed; second class 22, all built of steel, displacement 13 to 31 tons, and with speeds from 16 to 21 knots.

Torpedo boats, wood. There are eight built or building of from 50 to 60 ft. long, of 11 tons displacement, and 16·5 knots speed.

There are nine merchant steamers of more than 3000 tons on the auxiliary list, viz., China, Manilla, Orione, Perses, Raffaele, Rubattino, Singapore, Siris, and Washington. Of these, three are fitted for two torpedo-launching apparatus.

JAPAN.—Armoured Ships.

a.c., armoured cruiser; *a.g.b.*, armoured gunboat; *br.*, broadside ship; *c.b.*, central-battery ship; f. tu., l. car., fixed tube or launching carriage for discharging Whitehead torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour.		Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
					Belt.	Battery.					Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
Ram	**Adsuma** . . (iron) (was Stonewall Jackson)	1380	157 5	30 0	4	4	..	13 3	2	700	1 9-in. 13-ton M.L.R. (Armstrong), 4 6½-in. 5-ton do.	..	1864	..	9·00	..	..
c.b.	**Fu-Soo** . . . (iron)	3718	220 0	48 0	7	9	..	18 4	2	3500	4 24-c.m. 15-ton B.L.R. (Krupp), 2 17-c.m. 6-ton do., 6 L., 5 M.	..	1877	..	13·2	360	4500
a.c.	**Hi-yei*** . . (composite)	2200	231 0	40 9	4½	..	..	17 4	1	2490	3 17-c.m. 3½-ton B.L.R. (Krupp), 6 15-c.m. do.	..	1878	..	13·00	280	..
"	**Kin-go*** . (composite)	2200	231 0	40 9	4½	..	..	17 4	1	2450	3 17-c.m. 3½-ton B.L.R. (Krupp), 6 15-c.m. do.	..	1877	..	13·70	280	..
br.	**Rio-jo** . . (composite)	1459	213 3	34 5	4½	4	..	17 4	1	975	2 17-c.m. 6-ton B.L.R. (Krupp), 6 70-pdr. (Vavasseur).	..	1864	..	9·00	350	..
a.g.b.	**Tisima**	1480	..	..	..	..	..	..	..	..	.. .. ..	..	1888	..	..	..	..

* These are not armoured ships in the usual sense of the term. There is no armour as against end-on fire, and no armoured deck.

JAPAN.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *c.d.s.*, coast defence ships; *d.v.*, despatch vessel; *g.v.*, gun-vessel; P., deck protected throughout; *pp.*, deck protected amidships only; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.							knots.	tons.	knots.
g.v.	**Akagi**	615	164 0	27 0	steel	10 0	..	700	1 24-c.m. B.L.R (Krupp), 1 12-c.m. do., 2 M.	..	1888	..	12·00	..	..
d.v.	**Amaki**	908	200 0	29 6	wood	13 9	1	720	1 15-c.m. B.L.R. (Krupp), 4 12-c.m. do. .	..	1877	..	11·00	150	..
corv.	**Asama** (training ship) .	1104	206 9	33 9	"	10 10	1	300 (nom.)	8 17-c.m. B.L.R. (Krupp), 4 4½-in. do. (Armstrong), 4 l.	..	..	..	..	..	..
g.v.	**Atago**	615	164 0	27 0	steel	10 0	..	700	1 24-c.m. B.L.R. (Krupp), 1 12-c.m. do., 2 M.	..	1887	..	12·00	..	..
"	**Banjo**	595	154 0	25 0	wood	12 0	1	590	1 6-inch B.L.R., 1 4¾-inch do. . . .	..	1879	..	10·00	107	..
c.d.s.	**Chiyota**	4140	295 0	50 6	steel	20 6	2	5400	1 12½-in. 45-ton B.L.R., 11 4¾-in. do., 18 M.	..	Bldg.	..	16·00	..	..
d.v.	**Gwaki**	600	146 4	25 3	wood	12 2	1	650	1 15-c.m. B.L.R. (Krupp), 2 12-c.m. do. .	..	1888	..	10·00	..	..
c.d.s.	**Hasidate** . . .	4277	325 0	50 10	steel	21 2	2	5400	1 12½-in. 45-ton B.L.R., 11 4¾-in. do., 6 M.	..	Bldg.	..	16·00	..	..
g.v.	**Ho Sho**	470	120 0	24 0	"	9 6	1	240	2 M.L.R., 2 B.L.R.	..	1868	..	11·00	50	..
c.d.s.	**Itsukusima** . . P.	4277	325 0	50 10	..	21 2	2	5400	1 32-c.m. B.L.R., 11 13-c.m. Q.F., 6 M. .	4 f. tu. or l. car	1890	..	16·00	..	..
cr.	**Kaimon**	1490	210 0	32 0	steel	16 5	1	1250	1 17-c.m. 6-ton B.L.R. (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·00	..	..
g.v.	**Katsuraki** . . .	1476	206 9	36 0	composite	15 0	2	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do.	..	1885	..	13·00	..	..
"	**Maya**	615	164 0	27 0	"	10 0	..	700	1 24-c.m. B.L.R. (Krupp), 1 12-c.m. do., 2 M.	..	1886	..	12·00	..	..
c.d.s.	**Metsuchima** . . P.	4277	325 0	50 10	..	21 2	2	5400	1 32-c.m. B.L.R., 11 12-c.m. Q.F., 6 M. .	4 f. tu. or l. car.	1890	..	16·00	..	..
"	**Muzasi**	1476	206 9	36 0	composite	15 0	2	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do. .	..	Bldg.	..	13·00	..	..

cr.	**Naniwa**	P.	3650	300	0	46	0	steel	18	6	2	7235	2 26-c.m. 28 ton B.L.R. (Armstrong), 6 15-c.m. 5-ton (Krupp), 2 Q.F., 14 M.	4 f. tu. or l.car	1885	..	18·72	800	9000 at 13 kts.
d.v.	**Nis-chin**		874	204	0	29	0	wood	14	6	1	1270	1 7-in. M.L.R. (Armstrong) 6 30-pdr. (smoothbore)	..	..	..	11·00	..	..
cr.	**Shiodo**		2400	300	0	41	0	steel	..		..	..	11 12-c.m. (4·7-in.) B.L.R.	3 f. tu. or l. car	Bldg.	..	19 00	240	..
„	**Sei-ki**		810	200	0	30	0	„	13	2	1	720	1 15-c.m. B.L.R. (Krupp), 4 12-c.m. do.	..	1875	..	11·00	130	..
„	**Takao**		1760	230	0	33	0	composite	13	0	2	2330	4 6-in. B.L.R., 1 4¾-in. do.	2 f. tu. or l. car	1885	..	15·00	..	..
„	**Takachiho**	P.	3650	300	0	46	0	steel	18	6	2	7500	2 26-c.m. 28-ton B.L.R. (Armstrong), 6 15-c.m. 5-ton do., 2 Q.F., 14 M.	4 f. tu. or l.car	1885	..	18·72	800	9000 at 13 kts.
corv.	**Ten-rio**		1490	200	0	32	0	wood	16	5	1	1250	1 17-c.m. 6-ton B.L.R. (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·00	..	..
g.v.	**Tscho-kai**		613	155	0	27	0	steel	9	0	1	950	1 21-c.m. B.L.R., 1 12-c.m. do., 2 M.	..	1887	..	10·00	..	..
„	**Tsukushi**		1500	210	0	35	2	„	15	0	2	2887	2 10-in. 25-ton B.L.R. (Armstrong), 4 5-in. 4-ton do., 4 M., 2 l.	2 f. tu. or l.car	1882	..	17·00	250	..
„	**Wun Yo**		470	120	0	24	0	composite	11	0	1	..	4 M.L.R.	..	1868	..	10·00	60	..
d.v.	**Yaeyama**		1600	315	0	34	6	..	15	0	2	5400	3 12-c.m. B L.R., 6 M.	2 l. car.	1889	..	20·00	..	..
„	**Yamato**		1476	206	9	36	0	„	15	0	1	1600	2 17-c.m. B.L.R. (Krupp), 5 12-c.m. do., 2 M.	2 f. tu. or l.car	1885	..	13·00	..	..

Paddle despatch vessel.—Jungei, 1465 tons; 1430 horse-power; Kasuga, 1015 tons; 300 nominal horse-power.

Gunboats.—Moschum, Raiden, Tschintagata; 100 to 875 tons; 60 to 80 nominal horse-power.

Also yachts, training-ships, transports, &c.

Torpedo boats.—One built in this country and sent out in pieces and reinstated in Japan, 166 ft. long, 19½ ft. broad, of 200 tons displacement, 1600 horse-power, and 20 knots speed; and two others of the same type.

Four sea-going torpedo boats of 40 tons, and 20 knots speed.

Seventeen other first class boats and 5 second class boats.

MEXICO.—Unarmoured Ships.

g.v., gun-vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Democrata**	450	140 0	24 10	iron	11 2	1	600	2 6½-in. 4-ton M.R.L., 2 20-pdr. B.L.R. (Vavasseur)	..	1875	..	11·00	..	..
,,	**Mexico**	450	140 0	24 10	,,	11 2	1	600	2 6½-in. 4-ton M.R.L., 2 20-pdr. B.L.R. (Vavasseur)	..	1875	..	11·00	..	..

Mexico has also two 10-knot gunboats of small size, the Independencia and the Libertad, 125 ft. long and of 425 horse-power. Also five first-class torpedo boats now building.

NETHERLANDS.—Armoured Ships.

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Belt.	Armour. Turret.	Backing.	Mean Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.s.t.	**Bloedhond** . (iron)	1530	180	0	46	3	5½	8	9¾	9	6	2	680	1 28-c.m. 28-ton B.L.R. (Krupp), 2 M.	..	1869	..	8·50	90	..
„	**Buffel** . . (iron)	2198	195	6	40	0	6	8	9¾	15	6	2	2000	2 23-c.m. 13-ton M.L.R. (Armstrong), 2 M.	..	1868	..	12·40	150	..
„	**Cerberus** . . (iron)	1530	180	0	44	0	5½	8	9¾	9	7	2	617	1 28-c.m. 28-ton B.L.R. (Krupp), 2 M.	..	1869	..	8·50	90	..
„	**Draak** . . (iron)	2156	201	5	49	3	8	9	11¾	10	10	2	807	2 28-c.m. B.L.R. (Krupp), 2 M.	..	1877	..	8·00	100	..
„	**Guinea** . . (iron)	2378	195	6	40	0	6	8	9¾	16	9	2	2000	2 23-c.m. 13-ton B.L.R. (Armstrong), 2 M.	..	1870	..	12·00	135	..
„	**Haai** . . (iron)	1566	186	4	44	0	5½	8 5¼ C. Tower	9¾	10	2	2	672	2 23-c.m. 13-ton B.L.R. (Armstrong), 2 M.	..	1871	..	7·00	70	..
„	**Heiligerlee** . (iron)	1530	180	0	43	7	5½	8 4¼ C. Tower	9¾	9	6	2	630	2 23-c.m. 13-ton B.L.R. (Armstrong), 2 M.	..	1868	..	8·00	90	..
„	**Hijena** . . (iron)	1566	186	4	44	0	5½	8 5¼ C. Tower	9¾	10	2	2	654	2 23-c.m. 13-ton M.L.R. (Armstrong), 2 M.	..	1871	..	7·00	70	..
a.g.b.	**Isala** . . (iron)	367	150	11	24	11	4	5	5	4	3	2	306	2 12-c.m. B.L.R. (Krupp) .	..	1876	..	7·00	27	..
t.	**Koning der Nederlander** (iron)	5400	269	0	49	3	8	9 8 Pt. House.	11¾	20	0	2	4500	4 28-c.m. 25-ton M.L.R. (Armstrong), 4 12-c.m. B.L.R. (Krupp)	..	1874	..	11·00	620	..
c.s.t.	**Krokodil** . (iron)	1530	180	0	43	7	5½	8 4¼ C. Tower	9¾	9	6	2	630	2 23-c.m. 18-ton B.L.R. (Krupp), 2 M.	..	1868	..	8·00	90	..
„	**Luipard** . . (iron)	1525	186	4	44	0	5½	8 5½ C. Tower	9¾	9	2	2	680	1 28-c.m. 28-ton B.L.R. (Krupp), 2 M.	..	1876	..	7·00	70	..

NETHERLANDS.—Armoured Ships—*continued.*

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.		Displacement.	Length.		Beam.		Armour.		Backing.	Mean Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
								Belt.	Turret.						Guns.	Fish Torpedo Dis-chargers					
			tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.s.t.	**Matador** . .	(iron)	1935	201	5	49	3	5½	9	9¾	10	2	2	691	2 28-c.m. 28-ton B.L.R.(Krupp), 2 M.	..	1878	..	7·00	100	..
a.g.b.	**Merva** . .	(iron)	367	150	11	24	11	4	5	5	4	3	2	395	2 12-c.m. B.L.R. (Krupp) . .	..	1879	..	7·00	27	..
„	**Mosa** . .	(iron)	367	150	11	24	11	4	5	5	4	3	2	400	2 12-c.m. B.L.R. (Krupp) . .	..	1878	..	7·00	27	..
c.s.t.	**Panter** . .	(iron)	1566	186	4	44	0	5½	8 5¼ C. T.	9¾	10	2	2	660	2 23-c.m. 13-ton B.L.R. (Armstrong), 2 M.	..	1870	..	7·00	70	..
t.	**Prinz Hendrik der Nederlander**	(iron)	3375	229	7	42	7	4½	5½	9¾	18	1	1	2000	4 23-c.m. 13-ton M.L.R. (Armstrong), 4 12-c.m. B.L.R. (Krupp)	..	1866	..	12·00	350	..
a.g.b.	**Rhenus** . .	(iron)	367	150	11	24	11	4	5	5	4	3	2	310	2 12-c.m. B.L.R. (Krupp) . .	..	1877	..	7·00	27	..
c.s.t.	**Schorpioen** .	(iron)	2175	193	3	38	0	6	8 4¼ Pt. Tower.	11¾	15	10	2	2225	2 28-c m. 28-ton B.L.R. (Krupp) .	..	1868	..	12·00	200	1030
„	**Stier** . . .	(iron)	2069	194	10	38	0	6	8 4¼ P. T.	9¾	15	6	2	2257	1 28-c.m. 28-ton B.L.R.(Krupp), 2 M.	..	1868	..	12·40	160	..
„	**Tijger** . .	(iron)	1414	187	0	44	0	5½	8 4¼ C. T.	9¾	8	10	2	684	2 23-c.m. 13-ton M.L.R. (Armstrong), 2 M.	..	1868	..	8·00	70	..
a.g.b.	**Vahalis** . .	(iron)	340	120	5	27	6	4½	..	7	5	3	2	243	2 7½-c.m. B.L.R. (Krupp) . .	..	1870	..	6·00	22	..
c.s.t.	**Wesp** . .	(iron)	1566	186	4	44	0	5½	8	9¾ 5¼ C.T.	10	2	2	744	1 28-c.m. 28-ton B.L.R.(Krupp), 2 M.	..	1871	..	7·00	70	..
„	New Ship . .	(steel)	2500	..		..		5	..	..	..		2	..	2 11-inch 28-ton B.L. (Krupp), 3 Q.F., 2 M.	..	Bldg.	..	13·0	..	..

NETHERLANDS.—Unarmoured Ships.

((I) denotes vessels of the Dutch Indian Navy.)

corv., corvette; *fr.cr.*, frigate-built cruiser; *cr.*, cruiser; *g.v.*, gun-vessel; *sl.*, sloop.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	**Alkmaar**	1010	154 3	30 2	composite	15 9	1	830	1 15-c.m. B.L.R., 6 12-c.m. do. (Krupp)	..	1874	..	10·00	130	..
g.v.	**Arend** (I)	340	125 0	21 0	"	10 0	1	320	2 3-inch M.L., 2 l.	..	1880	..	10·50	..	..
"	**Aruba**	770	147 7	29 6	"	12 5	1	413	1 15-c.m. M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp), 2 M.	..	1873	..	9·00	100	..
fr.cr.	**At-jeh**	3160	262 5	39 4	iron & wood	20 7	1	2700	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 6 M.	..	1876	..	14·50	380	3000
g.v.	**Bali** (I) (was Eustatius)	853	147 7	29 6	"	11 10	1	516	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp), 2 M.	..	1878	..	9·50	100	..
"	**Banda** (I)	695	137 10	27 7	composite	11 10	1	198	1 16-c.m. M.L.R., 2 12-c.m. B.L.R. (Krupp)	..	1872	..	9·00	80	..
"	**Bandjermassin** (I)	732	137 10	28 10	"	11 10	1	370	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp).	..	1874	..	9·50	85	..
"	**Batavia** (I)	853	147 7	29 6	iron & wood	11 10	1	405	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp).	..	1876	..	9·00	100	..
"	**Bencoolen** (I)	853	147 7	29 6	"	11 10	1	516	1 15-c.m. B.L.R., 3 12-c.m. do (Krupp)	..	1879	..	9·60	100	..
"	**Bonaire**	853	147 7	29 6	"	11 10	1	412	1 15-c.m. B.L.R., 3 12-c.m do. (Krupp), 2 M.	..	1877	..	9·00	100	..
"	**Ceram** (I)	550	157 4	25 4	steel	10 6	1	650	3 12-c.m. B.L.R. (Krupp), 4 M.	..	1887	..	11·00	60	..
"	**Condor** (I)	320	126 0	21 0	composite	10 0	1	300	2 $2\frac{3}{4}$-in. B.L.R., 2 6-Pr. Q.F.	..	1885	..	10·00	25	..
corv.	**Curaçoa** (I)	2030	190 3	39 4	wood	18 4	1	680	8 16-c.m. M.L.R.	..	1863	..	..	..	..
fr.cr.	**De Ruyter**	3160	262 5	39 4	iron & wood	20 7	1	3305	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 4 M.	..	1880	..	14·50	380	3000
g.v.	**Flores** (I)	550	157 0	25 6	steel	10 6	1	650	3 $4\frac{3}{4}$-in. 2-ton B.L.R.	..	1887	..	11·00	60	..
"	**Halik** (I)	..	125 0	20 0	composite	10 0	1	..	.. ..	..	1878	..	8·50	..	..
cr.	**Java** (I)	1100	197 0	31 3	iron & wood	12 3	1	1020	1 6-in. B.L.R., 3 $4\frac{3}{4}$-in. do.	..	1885	..	10·60	125	..

NETHERLANDS.—Unarmoured Ships—*continued*.

((I) denotes vessels of the Dutch Indian Navy.)

corv., corvette; *fr.cr.*, frigate-built cruiser; *cr.*, cruiser; *g.v.*, gun-vessel; *sl.*, sloop.

Class.	NAME.	Displacement.	Length.		Beam.		Material of Hull.	Mean Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
fr.cr.	Johan Willem Friso	3160	262	5	39	4	iron & wood	20	7	1	3000	6 17-c.m. 6-ton B.L.R., (Krupp), 8 12-c.m. do. 4 M.	..	1886	..	14·50	380	3000
„	Koningin Emma der Nederlanden	3160	262	5	39	4	„	20	7	1	2750	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 4 M.	..	1879	..	14·60	380	3000
g.v.	Macassar (I)	853	147	7	29	6	„	11	10	1	394	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1876	..	9·00	100	..
„	Madura (I)	853	147	7	29	6	„	11	10	1	559	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp)	..	1880	..	9·70	100	..
„	Padang (I)	853	147	7	29	6	„	11	10	1	409	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp)	..	1878	..	9·40	100	..
„	Palembang (I)	732	137	10	28	10	composite	11	10	1	370	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1874	..	8·50	85	..
„	Pontianak (I)	832	147	7	29	6	„	11	10	1	360	1 18.-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1873	..	8·50	85	..
„	Riow (I)	832	147	7	29	6	„	11	10	1	204	1 16-c.m. M.L.R., 2 12-c.m. B.L.R. (Krupp)	..	1872	..	8·00	80	..
„	Samarang (I)	853	147	7	29	6	iron & wood	11	10	1	460	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1876	..	9·00	100	..
„	Sambas (I)	732	137	10	28	10	composite	11	10	1	374	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. B.L.R. (Krupp)	..	1874	..	8·50	85	..
„	Sommelsdijk	890	147	7	81	2	iron & wood	11	9	1	732	1 15-c.m. B.L.R., 3 12-c.m. do. (Krupp), 2 l.	..	1882	..	10·00	95	..
cr.	Sumatra P.	..	..		..		steel	..		2	3750	1 21-c.m. B.L.R., 1 15-c.m. do.	..	Bldg.	..	17·0	..	..

g.v.	**Surinam**	853	147	7	29	6	"	11	10	1	440	1 15-c.m. B.L.R. (Krupp), 3 12-c.m. do., 2 l.	..	1877	..	9·00	95	..
fr.cr.	**Tromp**	3160	262	5	39	4	"	20	7	1	2772	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 4 M.	..	1877	..	14·30	380	3000
corv.	**Van Galen**	2160	193	6	41	6	wood	18	2	1	833	4 16-c.m. B.L.R., 6 12-c.m. do (Krupp), 2 M.	..	1872	..	10·00	400	..
fr.cr.	**Van Speyk**	3160	262	5	39	4	iron & wood	20	7	1	3000	6 17-c.m. 6-ton B.L.R., 8 12-c.m. do. (Krupp), 4 M.	..	1882	..	14·20	380	3000
g.v.	**Zeemeeuv (I)**	340	125	0	20	0	composite	10	6	1	..	.. ..	..	1878	..	8·00	..	..
corv.	**Zilveren Kruis**	2160	193	6	41	7	wood	18	4	1	1440	4 16-c.m. B.L.R., 6 12-c.m. do. (Krupp), 4 M.	..	1869	..	10·00	300	..
g.v.	**Zwalur (I)**	340	123	0	21	0	composite	10	0	1	320	2 3-inch B.L.G., 2 2-inch do.	..	1882	..	10·50	..	..

Gunboats (*Staunch class*).—Balder, Braga, Bulgia, Dufa, Freijr, Hadda, Hefring, Heimdall, Njord, Thor, Tijr, Udur, Ulfr, Vali, Vidr, Wodan, of 245 tons, and of 100 to 250 horse-power; also, Bever, Brak, Das, Dog, Ever, Fret, Geep, Gier, Havik, Hydra, Lynx, Raaf, Sperwer, Vos, of 195 tons, and 100 to 250 horse-power.

Steel gunboat.—"No. 3," 108 tons and 172 I.HP.

First-class torpedo boats, ten seagoing, of about 80 tons displacement and 20 to 23 knots (built and building); two of 46 tons displacement and 21½ knots; and 20 boats of 29 tons displacement and 17 knots.

Also several large paddle steamers, training ships, transports, store-ships, surveying vessel, &c.

NORWAY.—Armoured Ships.

c.s., *t.*, coast-service turret ship; *a.g.b.*, armoured gunboat.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Turret.	Armour. Belt.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.s., t.	**Mjolner** .	1515	203 5	45 11	12	5	39	11 10	1	450	2 27-c.m. 18-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1868	66,800	8·00	138	..
„	**Skorpionen**	1447	200 2	45 11	12	5	39	11 6	1	350	2 27-c.m. 18-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1866	..	6·00	138	..
„	**Thor** . .	2003	203 5	49 3	14¼	7	38	13 2	1	600	2 27-c.m. 20-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1872	..	8·00	200	..
„	**Thrudvang**.	1515	200 2	45 11	12	5	39	11 10	1	500	2 27-c.m. 18-ton M.L.R. (Armstrong), 1 M., 1 l.	..	1867	..	8·00	138	..
a.g.b.	New ship (steel)	1113	203 6	30 6	..	..	..	..	2	2000	2 15-c.m. B.L.R., 4 6-ton do. Q.F., 6 M. . .	2 l. car.	Bldg.	..	..	..	..

NOTE.—The first four ships named above are built of iron.

NORWAY.—Unarmoured Ships.

corv., corvette; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	tons.	tons.	knots.
g.v.	**Ellida**	1000	187 0	32 8	wood	14 4	2	900	5 15-c.m. 4-ton Krupp, 1 12-c.m. do., 1 l., 2 M.	1 f. tu. or l. car	1880	..	12·00	97	..
fr.cr.	**Kong Sverre** . .	3472	252 7	49 3	„	22 4	1	1800	2 20-c.m. 7-ton M.L.R. (Armstrong), 4 17-c.m. M.L.R., 16 16-c.m. do., 22 8-in. smooth-bore, 6 l.	..	1860	..	11·00	377	..
corv.	**Nord Stjernen** . .	1609	216 6	39 4	„	17 9	1	800	4 16-c.m. 3-ton M.L.R., 10 8-in. smooth-bore, 3 l.	..	1862	..	9·00	195	..
fr.cr.	**St. Olaf**. . . .	2182	229 7	42 7	„	18 9	1	1200	1 20-c.m. 7-ton M.L.R. (Armstrong), 1 17-c.m. 5-ton, M.L.R., 12 16-c.m. 3-ton do., 20 8-in. 3-ton smooth-bores, 4 l.	..	1856	..	10·00	200	..
g.v.	**Sleipner** . . .	580	173 10	25 11	iron	9 6	2	800	1 26-c.m. 22-ton B.L.R., 1 15-c.m. 4-ton do. (Krupp), 1 M.	1 f. tu. or l. car	1877	..	12·00	80	..
g.v.	New vessel . . P.	1113	204 0	30 6	steel	..	2	2000	2 15-c.m. B.L.R., 4 65-m.m. Q.F., 6 M. . . .	2 l. car.	Bldg.	..	..	..	..

In addition to the ships and vessels given in the alphabetical lists, the Norwegian Navy possesses the following :—

Eleven Gunboats.—Brage, Gor, Nor, Riukan, Sarpen, Tyr, Uller, Vale, Vidar (189 to 280 tons; 100 to 450 indicated horse-power), one large gun and machine guns in each.

Sixteen smaller Gunboats.—Aasgardsrand, Arendal, Brevig, Dverg, Horten, Karmo, Kongsberg, Kristiansand, Langesund, Laurvig, Lillesand, Nök, Porsgrund, Skien, Skudernoes, Tönsberg (55 tons, 70 indicated horse-power, 7½ knots); each armed with one 5½-inch gun. Trold (97 tons; 65 indicated horse-power); also several smaller gunboats.

Torpedo boats.—Fifteen first-class; three second-class; and two Miners.

Also paddle steamer, transport, training ships, &c.

PERU.

Since the war with Chili the Peruvian Navy has been much reduced, and comprises only the following seagoing steamers :—

Diogenes and Lima (late Socrates), built in 1881, of 1700 tons displacement, 1800 horse-power, and 16-knot speed; also Callao, Colon, Duque de Guisa, Iquique, Lerzundi, Rimac (2100 tons, 13 knots), Tumbez, and the training frigate Apurimac.

PERSIA.

d.v., despatch vessel.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	Persepolis	1200	206 9	34 2	steel	19 7	1	454	1 10-c.m. B.L.R. (Krupp), 4 7-c.m. do	..	1885	..	10·00	..	..

Also one small double-screw steamer, the Sicza, for police duties, and a small 7-knot gunboat.

PORTUGAL.—Armoured Ship.

c.b., central battery-ship.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
c.b.	Vasco da Gama (iron)	2422	200 0	40 0	9	10	..	18 0	2	3605	2 26-c.m. 18-ton B.L.R. (Krupp), 2 15-c.m. do., 3 40-pdr. B.L.R. (Armstrong), 1 M.	..	1876	103,800	13·20	300	..

PORTUGAL.—Unarmoured Ships.

PORTUGAL.—Unarmoured Ships.

corv., corvette; *g.v.*, gun-vessel; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	**Affonso de Albuquerque**	1111	205 0	33 2	iron & wood	12 3	1	1055	2 6-in. B.L.R. (Armstrong), 5 5-in. do., 3 M.	..	1884	..	12·00	150	..
„	**Bartholomeu Dias**	1243	207 0	37 5	wood	20 6	1	400 (nom.)	1 6-in. B.L.R., 10 40-pdrs.	..	1858	..	10·00	360	..
g.v.	**Bengo**	462	125 7	24 7	composite	8 10	1	400	1 6-in. B.L.R., 2 15-c.m. do.	..	1879	..	10·00	80	..
„	**Cacongo**	580	141 0	24 9	steel	10 8	1	400	2 6-in. 4-ton B.L.R.	..	1886	..	11·00	..	..
„	**Diego Cam**	587	143 0	25 11	composite	10 10	1	400	2 15-c.m. 4-ton B.L.R.	..	1888	..	9·00	..	..
„	**Diu**	640	147 0	27 0	„	13 0	1	700	1 15-c.m. B.L.R. (Krupp), 4 M.	..	Bldg.	..	..	..	..
„	**Douro**	587	143 0	25 11	„	10 10	1	400	2 15-c.m. 4-ton B.L.R.	..	1873	..	9·00	80	..
corv.	**Duque de Terceira**	1418	180 2	34 2	wood	14 9	1	220 (nom.)	1 17-c.m. M.L.R. (Armstrong), 4 40-pdr. do.	..	1864	..	10·00	200	..
„	**Estephania**	2368	202 5	41 4	„	17 8	1	400 (nom.)	9 80-pdr. M.L. (Palliser)	..	1859	..	10·00	360	..
g.v.	**Liberal**	610	140 0	25 10	iron & wood	11 0	1	500	1 6-in. 4-ton B.L.R. (Armstrong), 6 M., 2 l.	..	1884	..	10·00	90	..
corv.	**Mindello**	1124	169 11	35 9	composite	13 5	1	900	2 7-in. 4-ton M.L.R. (Armstrong), 4 20-pdr. do. 2 l.	..	1876	..	11·00	100	..
g.v.	**Mandovi**	462	125 7	24 7	„	8 10	1	400	1 6-in. B.L.R., 2 M., 2 l.	..	1879	..	10·00	80	..
„	**Quanza**	587	143 0	25 11	„	10 10	1	100 (nom.)	3 15-c.m. 4-ton B.L.R.	..	1877	..	8·00	80	..
corv.	**Rainha de Portugal**	1124	169 11	35 9	„	13 5	1	900	2 7-in. M.L.R. (Armstrong), 4 20-pdr. do., 2 l.	..	1876	..	11·00	100	..
g.v.	**Rio Ave**	380	120 0	22 0	„	10 0	1	300	1 64-pdr. M.L.R., 2 40-pdr. do.	..	1880	..	8·00	65	..
„	**Rio Lima**	610	148 11	28 3	„	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Sado**	610	148 11	28 3	„	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Tamega**	610	148 11	28 3	„	10 6	1	500	1 15-c.m. 4-ton B.L.R. (Armstrong), 4 40-pdr. do.	..	1875	..	10·00	90	..
„	**Tejo**	587	143 0	25 11	„	10 10	1	400	2 15-c.m. 4-ton B.L.R.	..	1869	..	10·00	80	..
„	**Vouga**	721	161 0	27 7	iron & wood	11 10	1	600	1 6-in. B.L.R., 2 M., 4 l.	..	1882	..	9·00	100	..
„	**Zaire**	640	140 0	25 10	„	11 10	1	500	1 6-in. B.L.R. (Armstrong), 6 M., 2 l.	..	1884	..	10·00	20	..
„	**Zambezia**	590	143 0	26 0	composite	10 10	1	400	2 6-in. B.L.R., 6 M.	...	1886	..	9·00	80	..

Gunboats.—Two Cazono and Massabi, of steel, of 220 tons displacement and 450 horse-power, and 11 knots speed.

Torpedo boat.—Espadarte, first-class, 86 ft. long, of 54 tons, and of 19 knots speed.

Three torpedo boats, 110 feet long, 12 feet broad, 65 tons displacement, 700 indicated horse-power, 20 knots speed, built at Poplar in 1886.

Torpedo vessel or Miner.—Fulminante.

Three transports, seven screw steamers built and building, besides training ships, yachts, &c.

ROUMANIA.

The Kingdom of Roumania has—

The Elizabeta, a protected cruiser, 230 ft. long, 32 ft. 10 in. broad, 1320 tons displacement, 4500 horse-power, 18 knots speed, and carrying 4 17-c.m. B.L.R. guns, 8 machine guns, and 4 torpedo launching tubes. Also

Three coast-guard vessels—Olthul, Siretul, and Bistriti—length, 100 ft.; breadth, 13½ ft.; draught of water, 6 ft.; speed, 11 knots natural draught, and 13¼ knots with forced draught; indicated horse-power corresponding to 11 knots speed was 160. They carry 3 machine guns. They were built by the Thames Ironworks Co., and left the Thames in August, 1888.

There are also

Five gunboats of small size (45 to 110 tons).

Two paddle yachts, Romania and Stefancel Mare.

One screw steamer (two guns, two machine guns).

One towing torpedo steamer.

Three first-class torpedo boats, 120 ft. long, 56 tons displacement, and 21 knots speed.

Two second-class torpedo boats.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.) *a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Turret or Battery.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	ins.	ft. in.						£	knots.	tons.	knots.
c.s., t.	Adm. Chichagoff (iron)	3511	254 3	42 7	6	6	17½	18 9	1	2060	2 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
"	Adm. Greig . (iron)	3593	252 7	42 7	4½	6	17½	20 11	1	2031	3 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
"	Adm. Lazareff (iron)	3556	252 7	42 7	4½	6	17½	20 4	1	2004	3 11-in. 28-ton B.L.R., 4 l. .	..	1867	..	10·00	300	..
a.c.	Admiral Nachimoff (steel and iron and wood sheathed) . . .	7782	330 0	61 0	10	8 barbette	3-in. steel dk.	25 9	2	8000	8 8-in. 13-ton B.L.R., 10 6-in. 6-ton do., 12 M., 4 l.	4 f. tu. or l.car	1885	572,000	16·50	1200	..
c.s., t.	Adm. Spiridoff (iron)	3740	254 3	42 7	6	6	17½	19 1	1	2007	2 11-in. 28-ton B.L.R., 3 M., 4 l.	..	1868	..	10·00	300	..
b.	Alexander II. (steel and wood sheathed)	8440	326 0	67 0	14	10 barbette battery 4-inch armour in front of each of the 9-in. guns	2¼-in. steel dk.	23 0	2	8000	2 12-in. 50-ton B.L.R., 4 9-in. 19-ton do., 8 6-in. 6-ton do., 10 Q.F., 4 M., 4 l.	4 f. tu. or l.car	1887	..	15·50	..	..
c.s., t.	Bronenosetz . . (iron)	1482	200 0	45 11	5 1-in. plates	11 1-in. plates	..	12 2	1	481	2 9-in. 15-ton B.L.R. . .	..	1864	..	7·00	..	..
b.	Catherine II. B.S. (iron and steel)	10,150	331 0	69 0	16	14 barbette	12-in. and 3-in. steel dk.	27 1	2	11,000	6 12-in. (56-ton) B.L.R., 7 6-in. 6-ton do., 16 Q.F.	7 f. tu. or l.car	1886	900,000	16·00	886	1350 at 14 knots
c.s., t.	Charodeika . (iron)	2026	206 9	42 7	4½	6 turret	17½	12 2	2	786	4 9-in. 15-ton B.L.R., 1 M. .	..	1867	..	8·00	250	..
a.c.	Dimitri Donskoi (steel wood sheathed)	5893	296 5	52 0	6	unarmoured	steel dk. 2¼-in.	24 4	2	7000	2 8-in. 13-ton B.L.R., 14 6-in. 6-ton do., 14 M., 4 l.	4 f. tu. or l.car	1883	..	15·50	400	4800
b.	Dvenadsat Apostoloff	8076	320 0	60 0	14	12 (tower	5-in.)	25 8	2	8500 Nat. Dt.	8 9-in. 19-ton B.L.R. . .	6 f. tu. or l.car	Bldg. at Nicholaieff		15·00	..	..
c.s., t.	Edinorog . . (iron)	1407	200 0	45 11	5 1-in. plates	11 1-in. plates	39	..	1	460	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.) *a.c.*, armoured cruiser; *a.g.b.*, armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.b.*, central-battery ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour.		Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
							Belt.	Turret or Battery.						Guns. B.L.R. are of Russian Krupp pattern.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	inches.	inches.	ins.	ft.	in.						£	knots.	tons.	knots.
a.c.	**Gangoot** . . .	6592	278	0	62	0	partial belt 16	armoured casemate	..	21	0	2	6000	6 9-in. 19-ton B.L.R., 6 6-in. 6-ton do.	..	Building at Admlty. Works.		14·50	..	..
"	**General Admiral** (iron and wood)	4604	285	5	49	3	6	unarmoured	9¾	22	11	1	4472	6 8-in. 9-ton B.L.R., 2 6-in. do., 7 M., 5 l.	2 f. tu. or l.car	1873	..	12·00	1000	..
a.c.	**Gerzog Edinburgski** (iron and wood)	4604	285	5	49	3	6	unarmoured	9¾	22	11	1	5222	4 8-in. 9-ton 5 6-in. 4-ton B.L.R., 14 Q.F., 6 l.	2 f. tu. or l.car	1875	..	12·50	1000	..
b.	**Gheorghy Pobyedonosets**	10,280	320	0	69	0	16	..	..	26	7	2	15000	6 12-in. 56-ton B.L.R., 7 6-in. 6-ton do.	7 f. tu. or l.car	Bldg. at Sebas-topol.	431,000 hull and engines	16·00	700	..
a.g.b.	**Grozyashtchy** . .	1492	229	0	41	8	5	..	..	11	0	2	2000	1 9-in. 19-ton B.L.R., 1 6-in. 6-ton do.	2 f. tu. or l.car	Building at Admlty. Works		15·00	..	..
c.b.	**Knias Pojarski** . (iron)	5007	272	4	49	3	4½—3½	4½	..	23	11	1	new machinery	8 8-in. 9-ton B.L.R., 2 6-in. 4-ton do., 4 M., 8 l.	..	1867	..	12·50	600	..
c.s., t.	**Koldun** . . .(iron)	1666	200	0	45	11	5 1-in. plates	11 1-in. plates	39	12	0	1	481	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
c.s., br.	**Kreml** . . .(iron)	3664	219	10	52	5	4½	4½	17½	17	4	1	1121	12 8-in. 9-ton B.L.R., 2 6-in. do., 2 M., 6 l.	..	1864	..	6·00	..	..
c.s., t.	**Latnik** . . .(iron)	1515	200	0	45	11	5 1-in. plates	11 1-in. plates	39	12	2	1	490	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
"	**Lava** . . .(iron)	1591	200	0	45	11	5 1-in. plates	11 1-in. plates	39	12	0	1	335	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
a.c.	**Minin** . . .(iron)	6168	298	6	49	3	7	unarmoured	..	25	3	1	5290	4 8-in. 9-ton B.L.R., 12 6-in. 4-ton do., 12 Q.F., 4 l.	..	1878 altered	..	13·00	..	..
c.s., br.	**Netron-Menya** .(iron)	3494	219	10	53	0	4½	4½ battery	9¾	16	5	1	1632	12 8-in. 9-ton B.L.R., 2 M., 4 l.	..	1864	..	8·00	500	..
a.c.	**Navarin** . . .	9476	338	0	67	0	16	12	..	25	0	2	9000	4 12-in. 50-ton B.L.R., 8 6-in. 6-ton do.	6 f. tu. or l.car	Building at Franco-Russian Works		16·0	..	..
"	**Nicolai I.** (steel and wood sheathed)	8440	326	0	67	0	14	10 turret 6-in. battery	2½-in. steel dk.	90	0	2	8000	2 12-in. 52-ton B.L.R. 4 9-in. 19-ton do., 8 6-in. 6-ton do., 4 Q.F., 6 M., 4 l.	4 f. tu. or l.car	1888	453,000	15·00	..	..

a.g.b.	**Nikopol**, B.S. (iron & wood)	273	98	5	27	10	3	..	$9\frac{3}{4}$	5	0	2	320	.. ..	..	1868	..	8·00	..	..
circular c.s.	**Novgorod**, B.S. (iron and wood)	2706	101	0	101	0	9—7 with Hughes' Backing.	9	*	13	5	6	2000	2 11-in. 29-ton B.L.R., 2 M., 2 l.	..	1873	..	6·00	200	..
a.c.	**Pamyat Azova** (steel) (wood sheathing over armour)	6000	377	0	50	0	9	8 barbette	10-in. $2\frac{1}{2}$-in. steel dk.	25	0	2	11500	2 8-in $13\frac{1}{2}$-ton B.L.R., 12 6-in. 6-ton do., 12 Q.F. and M.	1 f. tu. 2 l. car	1887	350,000	18·00	1000	12,000
c.s., t.	**Perun** . . . (iron)	1549	200	0	45	11	5 1-in. plates	11 1-in. plates	..	12	2	1	338	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
t.	**Peter the Great** . (iron)	8749	328	2	62	4	14—8	8+6 turret	$9\frac{3}{4}$	23	0	2	8258	4 12-in. 40-ton B.L.R., 7 Q.F., 4 l.	1 f. tu. or l. car	1872	..	13·00	1200	..
br.	**Petropaulowski**‡ (wood)	6240	294	0	56	0	$4\frac{1}{2}$	$4\frac{1}{2}$	..	24	0	1	2800	21 8-in. 9 ton B.L.R., 1 6-in do.	..	1865	..	11·00	..	..
c.s.	**Pervenetz** . . (iron)	3279	219	10	52	5	$4\frac{1}{2}$	$4\frac{1}{2}$	$9\frac{3}{4}$	14	9	1	1067	6 8-in. 9-ton B.L.R., 6 6-in. 4-ton do., 5 M., 4 l.	..	1863	..	9·00	..	..
a.c.	**Rurik** . . (steel)	10,600	396	6	67	0	10	..	..	26	0	2	15000	4 8-in. $13\frac{1}{2}$-ton B.L.R., 16 6-in. 6-ton do.	5 f. tu. or l. car	Building at Baltic Works.		18·00	..	..
c.s., t.	**Rusalka** . . . (iron)	2026	206	9	42	7	$4\frac{1}{2}$	6 turret	$17\frac{1}{2}$	12	9	2	786	4 9-in. 15-ton B.L.R., 2 M. .	..	1867	..	8·00	250	..
c.s., br.	**Sevastopol**‡ . (wood)	6210	295	0	52	0	$4\frac{1}{2}$	$4\frac{1}{2}$	..	25	6	1	3090	10 8-in. 9 ton. B.L.R. . .	..	1863	..	12·00	..	..
b.	**Sinope**, B.S. (iron & steel)	10,181	331	0	69	0	16	14 barbette	12-in. 13-in. steel dk.	27	1	2	13000	6 12-in. 50-ton B.L.R., 7 6-in. 6-ton do., 16 Q.F.	7 f. tu. or l. car	1887	900,000	16·75	886	1350 at 14 kts.
a.g.b	**Sistovo**, B.S. . (iron)	384	105	0	30	10	3	..	$9\frac{3}{4}$	5	11	2	250	.. ..	..	1868	..	8·00	..	..
c.s., t.	**Smertch** . . . (iron)	1520	187	0	39	4	$4\frac{1}{2}$	6 turret	$7\frac{3}{4}$	11	6	2	700	2 9-in. 15-ton B.L.R., 1 M. .	..	1864	..	8·00	250	..
”	**Streletz** . . . (iron)	1431	200	0	45	11	5 1-in. plates	11 1-in. plates	39	11	6	1	444	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
b.	**Tchesmé**, B.S.. (iron & steel)	10,181	331	0	69	0	16	14 barbette	12-in. 3-in. steel dk.	27	1	2	11000	6 12-in. (50 ton) B.L.R., 7 6-in. 6-ton do., 16 Q.F.	7 f. tu. or l. car	1886	900,000	16·00	886	1350 at 14 kts.
c.s., t.	**Tifun** . . . (iron)	1666	200	0	45	11	5 1-in. plates	11 1-in. plates	39	12	5	1	453	2 9-in. 15-ton B.L.R., 1 M. .	..	1864	..	6·00	..	..
”	**Uragan** . . . (iron)	1415	200	0	45	11	5 1-in. plates	11 1-in. plates	39	11	6	1	432	2 9-in 15-ton B.L.R. . .	..	1864	..	6·00	..	..
circular c.s.	**Vice-Admiral Popoff**, B.S. (iron & wood)	3590	120	0	120	0	16	16 tower	9	13	5	6	3066	2 12-in. 40-ton B.L.R., 6 l. .	..	1875	..	6·00	250	..
c.s., t.	**Veshtchun** . . (iron)	1448	200	0	45	11	5 1-in. plates	11 1-in. plates	39	11	6	1	529	2 9-in. 15-ton B.L.R. . .	..	1864	..	6·00	..	..
a.c	**Vladimir Monomach** (steel & wood sheathed)	5796	296	6	52	0	6 comp.	unarmoured	..	24	11	2	7000	4 8-in. 13-ton B.L.R., 12 6-in. 4-ton do., 4 M., 4 l.	2 f. tu. or l. car	1882	..	15·40	400	..

* Hughes Backing.

‡ These ships are now employed for harbour service.

RUSSIA.—Unarmoured Ships.

(Bal., Baltic Fleet; B.S., Black Sea Fleet; Sib., Siberian Squadron.)

corv., corvette; *cr.*, cruiser; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *to.cr.*, torpedo cruiser; *sl.*, sloop; P, deck protected throughout; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

On the Russian List are the names of a large number of vessels which cannot be classified on the principles adopted in the British Navy. Many, though used for practically civil purposes, would be available for service of some kind in war. In the following Table steamers, with guns, of over 300 tons are included, and are designated despatch vessels (*d.v.*), or gun-vessels (*g.v.*).

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	**Abrek**, Sib.	1069	193 6	29 6	wood	13 1	1	1109	3 6-in. B.L.R., 1 M., 2 l.	..	1860	..	..	..	..
cr. P.	**Admiral Korniloff**, Bal. (2½ steel deck).	5000	350 0	48 6	steel & wood sheathed	23 0	2	8260	14 6-in. 6-ton B.L.R., 16 Q.F.	6 f. tu. or l.car	1887	296,000	19·00	..	..
corv.	**Afrika**, Bal.	2852	285 5	39 4	iron	17 1	1	1350	3 6-in. 4-ton B.L.R., 4 M., 7 l.	..	1877	..	13·00	..	..
cr.	**Aleüt**, Sib. (Mining Transport)	810	150 0	31 0	steel	12 7	1	730	.. ..	..	1886	24,000	..	..	..
„	**Asia**, Bal.	2483	269 0	36 0	iron	16 5	1	1100	4 6-in. 4-ton B.L.R., 6 M., 5 l.	..	1878	..	12·00	..	..
„	**Askold**, Bal.	2245	216 6	39 4	wood	20 4	1	910	8 6-in. 4-ton B.L.R., 5 M., 5 l.	..	1863	..	9·00	..	..
„	**Bayan**, Bal.	1998	206 9	36 0	„	18 4	1	978	4 6-in. 4-ton B.L.R., 2 M., 5 l.	..	1857	..	10·00	..	..
g.v.	**Bobr**, Sib.	950	187 0	35 2	steel	10 10	2	1000	1 9-in. 15-ton B.L.R., 1 6-in. 4-ton do., 4 M., 6 l.	..	1884	43,000	14·00	..	..
corv.	**Bogatyr**, Bal. (Dismantled)	2204	213 3	39 4	wood	19 4	1	991	8 6-in. 4-ton B.L.R., 1 M., 4 l.	..	1860	..	9·00	..	..
g.v.	**Bombory**, B.S.	760	160 9	26 3	„	14 5	1	230	2 small guns	..	1852	..	..	..	..
to.cr.	**Captain Sacken**, B.S.	600	230 0	24 0	steel	8 10	2	3500	10 Q.F.	..	1888	40,700	20·00	..	..
g.v.	**Chernomoretz**, B.S.	1200	210 0	35 0	steel	10 0	1	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F., 4 M.	2 f. tu. or l.car	1889	40,000	..	..	..
„	**Coreetz**, Sib.	1200	210 0	35 0	steel	10 0	2	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F.	2 f. tu. or l.car	1886	..	..	..	..
corv.	**Djigit**, Bal.	1456	206 9	32 10	iron & wood	16 1	1	1383	3 6-in. 4-ton B.L.R., 4 M., 4 l.	..	1876	..	12·50	..	..
g.v.	**Don**, B.S.	354	131 3	26 0	steel & wood sheathed	10 2	1	80 (nom.)	2 small guns	..	1856	..	..	..	..
„	**Donetz**, B.S.	1200	210 0	35 0	steel	10 0	1	2000	2 8-in. B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1887	40,000	..	..	..
„	**Gonez**, B.S. (Torpedo School)	735	178 10	26 0	iron	12 5	1	160	2 small guns	..	..	..	..	..	..

	(Dismantled)											..	..	..	..
g.v.	**Ingul**, B.S.	745	173 10	32 10	iron	12 5	1	469	2 guns	..	1872	..	..	..	..
d.v.	**Japonec**, Sib. transport	1472	200 2	36 0	wood	12 8	1	800 (nom.)	.. ..	..	1858	..	6·00	..	..
corv.	**Jemtchug**, Bal.	1781	239 6	29 6	iron	17 4	1	1438	3 6-in. 4-ton B.L.R., 6 M., 4 l.	2 f. tu. or l.car	1861	..	..	..	..
g.v.	**Jermak**, Sib.	706	154 3	26 3	iron	11 2	1	125	2 guns	..	1870	..	..	..	..
„	**Kasbeck**, B.S.	692	167 4	26 3	„	11 2	1	280	2 small guns	..	1854	..	..	..	..
tr.cr.	**Kazarsky**, B.S. (Bldg. at the Schichau Works).	400	190 4	24 4	steel	..	2	..	.. ..	..	Bldg.	31,500	21·0	..	..
„	**Kelasurz**, B.S.	307	121 4	19 7	wood	10 5	1	246	4 small guns	..	1859	..	..	..	..
corv.	**Kreyzer**, Bal.	1542	206 9	32 10	iron & wood	16 1	1	1205	3 6-in. 4-ton B.L.R., 1 M., 4 l.	..	1875	..	13·00	..	..
g.v.	**Kubanetz**, B.S.	1200	210 0	35 0	steel	10 0	1	2000	2 8-in. 10-ton B.L.R., 1 6-in. do., 6 Q.F.	3 f. tu. or l.car	1888	40,000	..	..	..
to.cr.	**Lieutenant Ilyn**, Bal.	600	230 0	24 0	steel	8 10	2	3500	19 Q.F.	8 f. tu. or l.car	1887	40,150	20·10	97	..
„	**Mandjur**, Bal.	1200	210 0	35 0	steel	10 0	2	2000	2 8-in. B.L.R., 1 6-in. do., 6 Q.F.	2 f. tu. or l.car	1886	..	13·00	..	..
g.v.	**Morz**, Sib. (Dismantled)	456	147 7	22 11	wood	8 3	1	150	7 guns	..	1860	..	..	..	..
corv.	**Nayezdnik**, Bal.	1334	206 9	32 10	composite	14 9	1	1719	3 6-in. 4-ton B.L.R., 5 M., 4 l.	..	1878	..	13·00	..	..
g.v.	**Nerpa**, Sib (Dismantled)	379	124 7	22 11	wood	7 10	1	60 (nom.)	5 guns	..	1860	..	..	..	..
corv.	**Oprichnik**, Bal.	1426	206 9	32 10	composite	16 0	1	1685	4 6-in. 4-ton B.L.R., 6 M., 2 l.	..	1880	..	13·00	..	..
cr.	**Pamyat Merkuriya**, B.S.	3050	292 0	39 4	iron & steel	19 7	1	800	4 18-ton B.L.R., 4 4-in. do.	2 f. tu. or l.car.	1880	..	14·00	..	..
d.v.	**Penderaklia**, B.S.	1052	190 3	29 6	iron	12 8	1	568	3 guns	..	1877	..	..	..	..
g.v.	**Pitsunda**, B.S.	335	137 11	19 7	wood	9 7	1	572	3 small guns	..	1857	..	..	..	..
sl.	**Plastun**, Bal.	1255	206 9	32 10	composite	14 1	1	1543	3 6-in. 4-ton B.L.R., 6 Q.F., 5 l.	..	1879	..	12·00	..	..
g.v.	**Prut**, B.S.	339	154 3	23 0	iron	7 3	1	327	2 guns	..	1849	..	..	..	..
„	**Psezuappé**, B.S.	335	127 11	19 7	„	10 5	1	216	4 small guns	..	1857	..	..	..	..
corv.	**Razboynik**, Bal.	1329	206 9	32 10	iron & wood	14 9	1	1786	3 6-in. 4-ton B.L.R., 6 M., 4 l.	..	1878	125,000	12·00	..	..
cr. P.	**Rynda**, Bal. (1½ inch steel deck.)	2950	265 9	45 11	steel & wood sheathed.	16 1	2	3600	10 6-in. 4-ton B.L.R., 6 M., 4 l.	2 f. tu. or l.car	1885	..	*15·00	710	2400
g.v.	**Salgir**, B.S.	360	131 3	23 0	wood	10 5	1	107	.. ..	..	1857	..	..	..	..
„	**Sivootch**, Sib.	950	187 0	33 2	steel	10 10	2	1000	1 9-in. 15-ton B.L.R., 1 6-in. 4-ton do., 4 M., 6 l.	..	1884	43,000	14·00	..	..

* The actual speed of this vessel has not exceeded 13 knots.

RUSSIA.—Unarmoured Ships—*continued.*

(Bal., Baltic Fleet; B.S., Black Sea Fleet; Sib., Siberian Squadron.)
corv., corvette; *cr.*, cruiser; *d.v.*, despatch vessel; *g.v.*, gun-vessel; *sl.*, sloop; *t. b. c.*, torpedo boat-catcher; P., deck protected throughout; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
corv.	**Skobeleff**, Bal.	2397	216 6	39 4	wood	19 0	1	1042	4 6-in. 4-ton B.L.R., 3 Q.F., 4 l.	..	1862	..	9·00	..	..
g.v.	**Sobol**, Sib. (Dismantled)	456	147 7	22 11	"	8 3	1	150	12 6-in. & 2 light guns	..	1863	..	..	..	..
sl.	**Sokol**, B.S. (Dismantled)	1057	160 9	32 10	"	15 5	1	346	1 6-in. 4-ton B.L.R., 1 M., 8 l.	..	1859	..	..	..	..
g.v.	**Souk-Su**, B.S.	307	121 4	19 8	"	10 5	1	317	3 guns	..	1859	..	..	..	..
corv.	**Strjelok**, Bal.	1343	206 9	32 10	composite	14 2	1	1528	3 6-in. 4-ton B.L.R., 4 M., 4 l.	..	1880	..	13·00	..	..
fr.cr.	**Svjetlana**, Bal.	3200	223 2	49 3	wood	22 4	1	1113	6 8-in. 9 ton B.L.R., 6 6-in. 4-ton do., 7 M., 5 l.	..	1858	..	10·00	..	..
g.v.	**Tamanj**, B.S.	551	173 10	25 11	iron	9 7	1	745	2 guns	..	1849	..	..	..	..
"	**Teretz**, B.S.	1200	210 0	35 0	steel	10 0	..	2000	3 9-in. 12-ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1888	40,000	..	..	..
"	**Tunguz**, Sib.	706	154 3	26 3	iron	11 2	1	130	4 guns	..	1870	..	..	..	..
"	**Turok**, B.S.	537	134 6	24 11	wood	11 2	1	422	2 guns	..	1846	..	..	..	..
"	**Uraletz**, B.S.	1200	210 0	35 0	steel	10 0	..	2000	3 9-in. 12-ton B.L.R., 1 6-in. do., 2 Q.F., 4 M.	3 f. tu. or l.car	1888	40,000	..	..	..
cr. P.	**Vitiaz**, Bal. (1½ steel dk.).	2950	265 9	45 11	steel & wood sheathed.	16 1	2	3000	10 6-in. 4 ton B.L.R., 9 Q.F., 4 l.	2 f. tu. or l.car	1884	125,000	*15·00	710	2400
sl.	**Vjestnik**, Bal.	1255	206 9	32 10	iron & wood sheathed.	14 2	1	1268	3 6-in. 4 ton B.L.R., 4 M., 4 l.	..	1879	..	12·00	..	..
corv.	**Voyin**, B.S. (Dismantled)	1652	183 9	39 4	wood	17 4	1	875	1 8-in. B.L.R., 5 6-in. do., 3 M., 4 l.	..	1858	..	..	..	..
sl.	**Zabiyaka**, Bal.	1234	219 10	29 6	iron	14 9	1	1470	2 6-in. 4-ton B.L.R., 4 M., 5 l.	..	1878	..	14·00	..	..
g.v.	**Zaporojets**, B.S.	1200	210 0	35 0	steel	10 0	2	1500	3 9-in. 12 ton B.L.R., 11 6-in. do., 2 Q.F., 4 M.	2 f. tu. or l.car	1887	40,000	..	..	..

* The actual speed of this vessel has not exceeded 13 knots.

Besides the ships and vessels given in the alphabetical list there are a large number of small steamers, two corvettes, Varyag and Voivoda; one cruiser, Europa; two gun-vessels, Gaidamak and Izomrod, and two gunboats, Kartetch and Otliv, used for harbour service only.

Gunboats, Staunch class (Baltic Fleet).—Boorya, Bouroun, Dojd, Grad, Groza, Meena, Snieg, Tutcha, Vikhr, Yersh (258 to 402 tons, 195 to 472 I.HP., 1 11-inch B.L.R.).

Gunboats (Baltic Fleet).—Korsun, 191 tons, and Shtcheet, 240 tons.

Steamers (Gun vessels, Despatch vessels, &c.) (Black Sea Fleet).—Abin, Ablanova, Batjuska, Bogot, Boltun, Brate, Brestovitz, Matushka, Redoot-kali, Rodeemai, Sestritsa, Taman, Tuabse (90 to 298 tons).

Steamer (Siberian Squadron).—Amur (190 tons).

Also yachts, training ships, paddle steamers, and the Caspian and Lake Aral Flotillas of small vessels. Among the yachts is the circular ship Opuit, formerly the Livadia, now fitted for transport work.

Torpedo boats, Baltic (First Class).—Eleven, from 100 feet to 152 feet long, 100 to 134 tons displacement, a speed of 20 knots, armed with two machine guns and two to four launching tubes. Twenty-one of 100 to 130 feet long, 40 to 90 tons displacement, and speed of 17 to 22 knots; armed with two to four machine guns and two bow tubes.

Second Class.—Eighty-seven of from 60 to 80 feet long, 24 tons displacement, and 17 knots speed.

Black Sea (First Class).—Twelve.

At the Schichau Works, two torpedo boats 152 ft. 6 in. long by 16 ft. 9 in., speed 26½ knots, are being built at cost of £15,200 each, for the Black Sea.

At Crichton's Works, Abo, Finland, two torpedo boats 152 ft. 3 in. long, 16 ft. 3 in. broad, and speed 22 knots, at a cost for the two of £34,580, for the Baltic.

Two (first-class) torpedo boats have been ordered at the Belino Henderikh Works, Odessa. Length, 126 feet; breadth, 14 feet 8 inches; draught of water, 3 ft. 8 in.; displacement, 81 tons; I.HP., 1100; speed, 21 knots. They are to be completed by June, 1892.

Note.—All the torpedo boats in Russia have names, but, as done for other countries, the names are not given here.

Auxiliary Steamers.

Class.	NAME.	Material built of.	Where built.	When built.	Length.	Breadth.	Depth of Water.	Displacement.	Horse-power of Engines.	No. of Screws.	
	BLACK SEA CO.				ft. in.	ft. in.	ft. in.	tons.			
Auxiliary Cruiser	**Argonaut**	..	..	..	..	..	..	..	..	..	
,,	**Czar**	steel	Newcastle	1883	319 0	37 0	23 6	2240	350 nom.	1	
,,	**Czarevna**	,,	,,	1883	319 0	37 0	23 6	2240	350 nom.	1	
,,	**Czaritza**	,,	,,	1883	319 0	37 0	23 6	2240	350 nom.	1	
,,	**Grand Duke Alexei**. . .	..	Building at Newcastle.	..	440 0	..	..	..	..	..	Will each cost 600,000 Rs., with 100,000 Rs. duty for each. To steam 18 knots.
,,	**Grand Duke Constantine** .	..	Building at Newcastle.	..	440 0	..	..	..	..	..	
	VOLUNTEER FLEET.										
,,	**Aryol** (said to steam 19 knots) .	..	Newcastle	..	..	..	..	..	..	..	Delivered at Odessa, March 1890.
,,	**Kostroma**	iron	Glasgow	1873	372 0	36 0	..	3030	..	..	
,,	**Moskva** (was Kinfauns Castle) .	,,	,,	1879	360 0	43 0	..	3050	2730	1	
,, (a)	**Nijni Novgorod** (was Saxonia) .	,,	Greenock	1857	321 0	40 0	..	2670	300 nom.	1	
,,	**St. Petersburg** (was Thuringia) .	,,	,,	1870	340 0	41 0	..	3050	2600	1	
,,	**Russia** (was Holsatia) . .	,,	,,	1868	341 0	40 0	21 0	3100	2200	1	
,,	**Vladivostock**	,,	Renfrew	1880	324 0	29 0	..	1200	..	1	
,, (a)	**Yaroslav**	,,	La Seyne	1880	295 0	41 0	..	2350	3000	1	

(a) Coast service only (Black Sea).

SARAWAK.

Gunboat.—Aline: length 242 ft. 6 in.; beam, 21 ft. 3 in.; tonnage, 175; 35 nom. HP.; 2 guns; launched 1875. Lorna Doone; length, 103 ft. 4 in.; beam, 17 ft. 2 in.; tonnage, 118; 40 nom. HP. 2 guns; launched 1881.

Paddle steamer, Aden, Three armed launches (50 to 100 tons).

SIAM.—Unarmoured Ships.

Two corvettes (1000 tons, 8 guns); three gun-vessels; two gun-boats; yachts, and small craft.

2 A

SPAIN.—Armoured Ships.

a.g.b., armoured gunboat; *b.*, barbette ship; *br.*, broadside ship; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Armour. Belt.	Armour. Battery.	Backing.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	inches.	inches.	inches.	ft. in.						£	knots.	tons.	knots.
a.c.	**Almirante Oquendo**	7000	365 0	65 0	12	12 conning tower.	..	21 0	2	15,000	2 24-c.m. B.L.R., 10 14-c.m. do., (all Hontoria), 8 6-pdr. Q.F., 10 M.	8 f. tu. or l. car	Bldg.	600,000	20·00	..	..
a.g.b.	**Duque de Tetuan** (Harbour Service) (iron)	703	141 0	31 2	4	4	9	6 10	2	190	1 16-c.m. (Parrot), 4 bronze smooth-bores.	..	1874	..	..	23	..
a.c.	**Infanta Maria Teresa**	7000	365 0	65 0	12	12 conning tower.	..	21 0	2	15,000	2 24-c.m. B.L.R., 10 14-c.m. do., (all Hontoria), 8 6-pdr. Q.F., 10 M.	8 f. tu. or l. car	Bldg.	600,000	20·00	..	..
br.	**Numancia** (iron)	7305	314 10	55 9	5½	5	12	25 3	1	3708	8 10-in. M.L.R. (Armstrong), 7 8-in. do., 2 M., 8 l.	..	1863	315,600	8·00	740	2450
b.	**Pelayo** . (steel)	9900	330 0	66 0	17¾	19¼ barbettes.	..	24 11	2	8000	2 32-c.m. 48-ton B.L.R., 2 28-c.m. 38-ton B.L.R., 1 16-c.m. do., 12 12-c.m. do., 14 M.	7 f. tu. or l. car	1887	..	16·00	700	..
c.s., t.	**Puig-cerda** (Harbour Service) (iron Monitor)	553	127 11	29 6	4	4	9	6 7	2	328	2 16-c.m. bronze smoothbores, 1 16-c.m. B.L.R. (Palliser).	..	1874	..	8·00	23	..
br.	**Sagunto** (Harbour Service) (wood)	7352	292 0	55 10	6	6	24	30 1	1	3700	8 9-in. 13-ton M.L.R. (Armstrong), 3 18-c.m. (Palliser), 2 M., 8 l.	..	1869	..	8·00	900	..
a.c.	**Viscaya** . .	7000	365 0	65 0	12	12 conning tower.	..	21 0	2	15,000	2 24-c.m. B.L.R., 10 14-c.m. do., (all Hontoria), 8 6-pdr. Q.F., 10 M.	8 f. tu. or l. car	Bldg.	600,000	20·00	..	..
b.r.	**Vitoria** . (iron)	7250	318 3	55 10	5½	5	12	25 3	1	4500	8 9-in. 13-ton M.L.R. (Armstrong), 3 8-in. do., 2 M., 6 l.	2 f. tu. or l. car	1865	..	11·00	900	..
„	**Zaragoza** . (wood).	5620	278 10	55 10	5	5	26	24 7	1	3000	4 9-in. 13-ton M.L.R. (Armstrong), 3 18-c.m. (Palliser), 8 16-c.m. do., 2 M., 7 l.	..	1867	..	8·00	700	..
a.c.	Three belted cruisers . (Not named).	7000	365 0	65 0	..	..	..	21 0	2	[illegible]	2 24-c.m. B.L.R., 10 14-c.m. do., (all Hontoria), 8 6-pdr. Q.F., 10 M.	8 f. tu. or l. car	Bldg.	600,000 each	20·00	..	..

SPAIN.—Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; *pp.*, partial deck protected; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
d.v.	**Africa**	629	157 5	23 3	wood	15 3	1	280	2 12-c.m. bronze smooth-bores . .	..	1862	..	7·00	120	..
cr.	**Alfonso XII.**	3090	278 10	42 7	steel	16 5	1	4800	8 16-c.m. B.L.R. (Hontoria), 4 9-c.m. do., 2 M., 2 l.	6 f. tu. or l.car	1887	..	17·50	600	..
cr.	**Alfonso XIII.** . . P.	5000	318 6	50 6	steel	20 0	2	11,000	4 24-c.m. B.L.R., 6 12-c.m. do., 8 Q.F., 8 M.	5 f. tu. or l.car	Bldg.	..	20·00	1100	..
fr.cr.	**Almanza** (Surveying ship) .	3960	275 7	49 3	wood	20 11	1	600 (nom.)	22 16-c.m. M.L.R. (Palliser), 2 M., 6 l. .	..	1864	..	7·00	650	..
g.v.	**Animosa** (for Colonial Guard ship)	510	150 11	26 3	iron	7 7	1	100 (nom.)	1 16-c.m. 6-ton M.L.R. (Palliser), 1 12-c.m. bronze smooth-bore, 2 l.	..	1860	..	8·00	..	..
cr.	**Aragon**	3342	246 0	45 11	wood	20 11	1	4400	8 16-c.m. B.L.R. (Hontoria), 2 8·7-c.m. do. (Krupp), 4 l., 2 M.	..	1879	..	14·00	470	..
g.v.	**Audaz**	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M. .	2 l. car.	1889	..	18·0	106	..
g.v.	**Bazan**	757	164 0	24 7	iron	10 10	2	739	1 13-c.m. M.L.R. (Parrot), 1 12-c.m. bronze smooth-bore.	..	1873	..	10·00	..	..
fr.cr.	**Blanca** (for Colonial Guard ship)	2452	209 11	42 7	wood	18 4	1	360 (nom.)	12 20-c.m. smooth-bores, 4 16-c.m. do., 4 l.	..	1859	..	8·00	300	..
fr.cr.	**Carmen** (for Colonial Guard ship)	3116	242 9	45 11	wood	19 7	1	600 (nom.)	16 20-c.m. smooth-bores, 4 16-c.m. do., 4 l.	..	1861	..	8·00	460	..
cr.	**Castilla**	3342	246 0	45 11	wood	20 11	1	4400	8 15-c.m. B.L.R. (Krupp), 4 9-c.m. do. (Hontoria), 2 M., 2 l.	..	1881	..	14·00	470	..
"	**Concha**	524	157 5	25 7	iron	8 7	2	600	3 12-c.m. B.L.R. (Hontoria), 2 M. . .	2 f. tu. or l.car	1885	..	11·50	80	..
fr.cr.	**Concepcion** (for Colonial Guard ship)	3210	229 7	45 11	wood	20 1	1	2100	5 16-c.m. M.L.R., 16 20-c.m. smooth-bores, 4 l.	..	1860	..	8·00	360	..

SPAIN.—Unarmoured Ships—*continued.*

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *to.g.b.*, torpedo gun-boat; P, deck protected throughout; *pp.*, partial deck protected; f. tu., l. car., fixed tube or launching carriage for Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
cr.	Conde de Venadito . .	1130	210 0	32 0	iron	12 6	1	1600	2 4¾-in. B.L.R., 2 3-½in. do., 5 M. . .	2 f. tu. or l.car	1888	..	14·00	220	..
„	Cristobel Colon . .	1130	210 0	32 0	iron	12 6	1	1600	3 6-in. B.L.R., 2 3½-in. do., 5 M. . .	2 f. tu. or l.car	1887	..	14·00	220	..
„	Don Antonio Ulloa . .	1130	210 0	32 0	iron	12 6	1	1600	3 6-in. B.L.R., 2 3½-in. do., 5 M. . .	2 f. tu. or l.car	1887	..	14·00	220	..
„	Don Juan de Austria .	1130	210 0	32 0	iron	12 6	1	1600	3 6-in. B.L.R., 2 3½-in. do., 5 M. . .	2 f. tu. or l.car	1887	..	14·00	..	..
to.g.b.	Destructor . . .	458	192 6	25 0	steel	mean dt. 7 0	2	3800	1 9-c.m. B.L.R., 4 6-pr. Q.F., 4 M. . .	3 f. tu. or l.car	1887	..	22·56	..	5500
g.v.	El Cano	524	157 5	25 7	iron	8 6	2	600	3 12-c.m. B.L.R. (Hontoria), 2 M. . .	or l.car	1885	..	11·50	80	..
cr.	Ensenada . . . *pp.*	1030	185 0	30 0	steel	11 6	2	1600	6 12-c.m. B.L.R. (Hontoria), 4 M. . .	3 f. tu. or l.car	Bldg.	..	15·00	..	..
g.v.	Galicia	600	190 0	23 0	steel	10 4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M. .	2 l.car.	Bldg.	..	18·0	106	..
d.v.	Fernando el Catolico .	500	157 5	25 7	iron	8 5	2	550	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·00	20	..
g.v.	General Lezo . . .	524	157 5	25 7	iron	8 6	2	600	3 12-c.m. B.L.R. (Hontoria), 2 M. . .	1 f. tu. or l.car	1885	..	11·00	80	..
fr.cr.	Gerona	3980	265 9	49 3	wood	20 8	1	600 (nom.)	21 smooth-bores, 2 l.	..	1864	..	9·00	675	..
sl.	Infanta Isabel . . .	1130	210 11	32 2	iron	12 5	2	1500	5 12-c.m. B.L.R. (Hontoria), 5 M., 2 l. .	..	1885	..	14·00	220	..
sl.	Isabel II.	1130	210 11	32 2	iron	12 5	2	1500	5 12-c.m. B.L.R. (Hontoria), 5 M., 2 l. .	..	1886	..	14·00	220	..
cr.	Isla de Cuba . . *pp.*	1030	185 0	30 0	steel	11 6	2	2200	6 4-¾in. B.L.R., 4 6-pdr. Q.F. . . .	3 f. tu. or l.car	1887	..	16·00	160	..

,,	**Isla de Luson**	*pp.*	1030	185	0	30	0	steel	11	6	2	2200	6 4½-in. B.L.R., 4 6-pdr. Q.F.	3 f. tu. or l.car	1887	..	16·00	160	..
,,	**Jorge Juan**		935	203	5	29	6	wood	12	2	1	1100	3 16-c.m. 6-ton M.L.R. (Palliser), 2 M., 2 l.	..	1876	..	13·00	130	..
,,	**Lepanto**	P.	5000	318	6	50	6	steel	20	0	2	11,000	4 24-c.m. B.L.R., 6 12-c.m. do., 8 Q.F., 8 M.	5 f. tu. or l.car	Bldg.	..	20·00	1100	..
g.v.	**Ligera**		445	147	7	23	7	wood	8	10	1	393	2 16-c.m. M.L.R., 1 12-c.m. smooth-bore, 1 l.	..	1864	..	7·00	180	..
,,	**Magellanes**		524	157	5	25	7	iron	8	6	2	600	3 12-c.m. B.L.R. (Hontoria), 2 M.	..	1885	..	11·00	80	..
d.v.	**Marques del Duero**		500	157	5	25	7	iron	8	5	2	550	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·00	90	..
cr.	**Navarra**		3342	232	11	42	7	wood	20	4	1	4400	8 16-c.m. B.L.R. (Hontoria), 2 8·7-c.m. do. (Krupp), 2 M., 4 l.	..	1881	..	13·00	470	..
fr.cr.	**Navas de Tolosa**		4460	265	9	49	3	wood	22	4	1	600 (nom.)	22 16-c.m. M.L.R. (Palliser), 4 16-c.m. smooth-bores, 4 l.	..	1865	..	7·00	670	..
g.v.	**Nueva Espana**		600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M.	2 l. car.	1889	..	18·00	106	..
,,	**Prosperidad**		420	141	0	22	7	wood	9	7	1	134	2 16-c.m. smooth-bores, 1 M., 1 l.	..	1865	..	6·00	80	..
,,	**Rapido**		600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M.	2 l. car.	Bldg.	..	18 00	106	..
cr.	**Reina Christina**		3090	278	10	42	7	steel	16	5	1	4800	8 16-c.m. B.L.R. (Hontoria), 4 9-c.m. do., 2 M., 2 l.	5 f. tu. or l.car	1886	..	17·50	600	..
,,	**Reina Mercedes**		3090	278	10	42	7	steel	16	5	1	4860	8 16-c.m. B.L.R. (Hontoria), 4 9-c.m. do., 2 M., 2 l.	5 f. tu. or l.car	1887	..	17·50	600	..
,,	**Reina Regente**	P.	5000	318	6	50	6	steel	20	0	2	11,000	4 24-c.m. 21-ton B.L.R., 6 12-c.m. do., 8 Q.F., 8 M.	5 f. tu. or l.car	1887	..	20·70	1100	..
sl.	**Sanchez Barcaistegui**		935	203	5	29	6	wood	12	2	1	1100	3 16-c6.m. -ton M.L.R. (Palliser), 2 M., 2 l.	..	1876	..	13·00	130	..
d.v.	**San Quentin**		1300	246	0	32	10	iron	11	6	1	1500	3 12-c.m. B.L.R. (Hontoria), 1 M., 2 l.	..	1856	..	10·00	360	..
g.v.	**Sirena**		445	147	7	22	11	wood	9	6	1	227	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 2 l.	..	1863	..	8·00	95	..
,,	**Temerario**		600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M.	2 f. tu or l. car	1889	..	18·00	106	..
corv.	**Tornado** (Torpedo School ship)		2090	219	10	32	10	composite	14	5	1	328 (nom.)	2 16-c.m. M.R.L. (Palliser), 2 12-c.m. smooth-bores, 2 l.	..	1866	..	9·00	350	..
to.g.b.	Torpedo Gunboats (four vessels)		600	(Ordered to be built.)					..		..	..	.. .. ..	..	..	..	..	..	..
g.v.	**Valiente**		733	150	1	25	11	iron	7	10	1	380	1 16-c.m. M.R.L. (Palliser) 1 12-c.m. smooth-bore, 2 l.	..	1860	..	7·00	130	..
sl.	**Velasco**		1152	209	11	29	3	iron	12	5	1	1500	3 15-c.m. 4-ton B.R.L. (Armstrong), 1 M., 2 l.	..	1881	..	14·30	220	..
g.v.	**Veloz**		600	190	0	23	0	steel	10	4	2	2600	2 12-c.m. B.L.R. (Hontoria), 4 Q.F., 1 M.	2 l. car.	Bldg.	..	18·0	106	..

Besides the ships and vessels in the alphabetical list there are the paddle-vessels, Ferrolano, Gaditano, Liniers, training ships and transports; also

Gunboats.—Alsedo, Cocodrillo, Cuba-Española, Eulalia, Pelicano, Pilar, Salamandra (216 to 245 tons, 199 to 240 I.HP.).

Small steamers, classed as third-class gunboats, forty-three in number (33 to 179 tons).

Torpedo-boats.—Six seagoing torpedo-boats of the Ariète type, of 135 feet in length, 108 tons displacement and 26·11 knots speed; two torpedo-boats of the Falke type, 108 tons displacement, 135 feet in length, and 23 knots; and six other first-class boats.

SWEDEN.—Armoured Ships.

a.g.b., armoured gunboat; *c.s.*, coast-service vessel; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.		Displacement.	Length.		Beam.		Armour.		Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
								Turret.	Water-line.						Guns.	Fish Torpedo Dis-chargers					
			tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
a.g.b.	Berserk .	(iron)	452	131	3	29	6	14	2½	34	8	3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1874	..	8·00	19	..
„	Bjorn .	(iron)	457	131	3	26	3	14	2½	34	8	3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1874	..	8·00	19	..
„	Fenris .	(iron)	259	104	11	22	4	11	2	34	7	10	1	44	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1872	..	6·00	7	..
„	Folke .	(iron)	460	131	3	26	3	14	2½	34	8	3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1875	..	8·00	19	..
„	Garmer .	(iron)	268	91	10	22	11	6	2	8	7	7	1	90	1 27-c.m. 24-ton B.L.R., 2 M. . .	..	1868	..	6·00	15	..
„	Gerda .	(iron)	457	131	3	26	3	14	2½	34	8	3	2	133	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1873	..	8·00	19	..
t.	Gota .	(steel)	3070	258	6	48	0	11½–9¾	11½–8	..	10	1	2	3100	2 10-in. 29-ton B.L.R., 4 6-in. do. .	1 f. tu. or l. car.	Bldng.	..	15·50	200	..
„	Hildur .	(iron)	457	131	3	26	3	14	2½	34	8	3	2	133	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1872	..	8·00	19	..
c.s., *t.*	John Ericsson	(iron)	1500	200	2	45	11	11	4½	31½	11	6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1865	..	6·00	112	..
„	Loke .	(iron)	1600	205	3	45	11	18	4	40	11	10	1	430	2 24-c.m. 15-ton B.L.R., 3 M. . .	..	1871	..	7·00	112	..
a.g.b.	Skold .	(iron)	247	104	11	22	4	9	1	34	8	3	1	17	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1869	..	4·00	5	..
„	Sölve .	(iron)	454	131	3	29	6	14	2½	34	8	3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1875	..	8·00	19	..
t.	Svea .	(steel)	2900	249	4	49	3	11½	11½	11½	15	9	2	3100	2 10-in. 27-ton B.L.R. (Armstrong), 4 6-in. 4-ton do., 6 M.	6 f. tu. or l. car	1886	127,300	15·45	200	800 at 12 knots.
c.s., *t.*	Thordon .	(iron)	1500	200	2	45	11	11	4½	26	11	6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1866	..	6·00	112	..
„	Tirfing .	(iron)	1500	200	2	45	11	11	4½	26	11	6	1	380	2 24-c.m. 15-ton B.L.R., 2 M. . .	..	1867	..	6·00	112	..
a.g.b.	Ulf . .	(iron)	457	131	3	26	3	14	2½	34	8	3	2	155	1 24-c.m. 15-ton B.L.R., 2 M. . .	..	1873	18,000	8·00	20	..

SWEDEN.—Unarmoured Ships.

corv., corvette; *fr. cr.*, frigate-built cruiser; *g.v.* gun-vessel; *tor. ship*, torpedo ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Material of Hull.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.		ft.	in.						£	knots.	tons.	knots.
corv.	Balder	1886	203	5	36	0	wood	18	4	1	1380	4 15-c.m. B.L.R. (Armstrong), 2 12-c.m. B.L.R., 6 M., 1 l.	..	1870	..	12·00	200	940
g.v.	Blenda	500	167	4	25	11	iron	9	2	2	590	1 27-c.m. 24-ton B.L.R. (Armstrong), 1 12-c.m. B.L.R., 2 M.	..	1875	..	12·00	98	..
„	Disa	500	167	4	25	11	„	9	2	2	590	1 27-c.m. 24-ton B.L.R. (Armstrong), 1 12 c.m. B.L.R., 2 M.	..	1877	..	12·00	98	..
tor. ship.	Drott (was Ran) (Torpedo vessel)	630	173	10	26	3	„	9	6	2	960	4 Engström, Q.F.	3 f. tu. or l.car	1877	..	13·00	100	1000
g.v.	Edda	640	180	5	27	3	„	9	6	2	960	1 27·4-c.m. 27-ton B.L.R., 1 15-c.m., do. 4 M.	..	1882	..	13·00	80	..
corv.	Freja	2000	216	6	39	4	steel&wood	18	9	1	1750	4 15-c.m. 4-ton B.L.R., 8 12-c.m. do., 8 M.	..	1885	..	12·00	180	..
g.v.	Rota	537	170	7	26	3	iron	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1878	..	13·00	80	..
corv.	Saga (School Ship)	1535	200	2	32	10	wood	17	1	1	900	1 15-c.m. 5-ton B.L.R. (Armstrong), 6 12-c.m. B.L.R, 4 M., 2 l.	..	1878	..	11·00	170	..
g.v.	Skaggald	537	170	7	26	3	iron	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1879	..	13·00	80	..
„	Skagul	537	170	7	26	3	„	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1878	..	13·00	80	..
„	Skuld	537	170	7	26	3	„	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1880	..	13·00	80	..
„	Urd	537	170	7	26	3	„	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1877	..	13·00	80	..
fr. cr.	Vanadis	2136	209	11	42	7	wood	20	1	1	1400	8 17-c.m. 5-ton B.L.R., 8 16-c.m. 3-ton shell guns, 4 M.	..	1862	..	11·00	235	..
g.v.	Verdande	537	170	7	26	3	iron	9	2	2	780	1 27-c.m. 24-ton B.L.R., 1 12-c.m. do., 2 M.	..	1879	..	[illegible]	80	..

Gunboats.—Alfhild, Aslog, Astrid, Gunhild, Sigrid (180 to 200 tons, and about 130 I.HP.), each carrying 1 12-c.m. B.L.R. and 2 M.

Torpedo-boats—First-class: four of 65 tons and 19 knots speed, six other first-class boats of 40 tons displacement and 18 knots speed, one of 34 tons displacement and 16 knots speed, and seven other boats of smaller size and less speed.

One first-class boat is building.

The Swedish Navy has, besides the Torpedo School-vessel Ran, built of steel and of 175 tons displacement, 140 I.HP. and 10 knots speed, training ships, transports, surveying vessels, and some steamers of old construction.

TURKEY.—Armoured Ships.

a.g.b., armoured gunboat; *br.*, broadside ship; *c.b.*, central-battery ship; *t.*, turret ship; f. tu., l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Turret or Battery.	Armour. Belt.	Backing.	Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.b.	**Assar-i-Schefket** .(iron)	2080	203	5	42	7	4½	6	9	16	5	2	1750	5 8-in. 7-ton M.L.R. (Armstrong), 2 l., 5 M.	..	1868	..	11·00	300	..
„	**Assar-i-Tevfik** .(iron)	4687	272	4	52	6	6	8	9	24	11	1	3560	8 9-in. 12-ton M.L.R. (Armstrong), 5 l., 8 M.	..	1868	..	13·00	400	..
„	**Avni-Illah** . . .(iron)	2400	226	4	36	0	5	6	10	16	5	1	2200	4 9-in. 13-ton M.L.R. (Armstrong), 1 12-c.m. K. B.L., 1 l., 6 M.	..	1869	..	12·00	220	..
br.	**Azazieh** . . .(iron)	6400	292	0	55	9	5	5¼	9	25	7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 7-ton do., 8 M.	..	1864	..	13·00	750	..
c.b.	**Feth-i-Bulend** . .(iron)	2806	236	3	39	4	6	9	10	18	1	1	3250	4 9-in. 12-ton M.L.R. (Armstrong), 2 7-in. 6-ton do., 2 l., 6 M.	..	1869	..	13·00	300	..
a.g.b.	**Feth-el-Islam** . .(iron)	335	101	9	24	7	3	3	10	5	11	1	290	2 7-in. (Armstrong), 1 l.	..	1864	..	8·00	20	..
c.b.	**Hamidieh** . . .(iron)	6700	292	0	55	9	5	9	18	24	10	1	6800	10 24-c.m. 13-ton B.L.R. (Krupp), 2 17-c.m. 6-ton do., 6 l., 2 M.	..	1885	..	13·00	600	..
a.g.b.	**Hisber** (was Nusritieh) (iron)	404	144	4	30	10	3	3	5½	5	7	1	400	2 15-c.m. B.L.R. (Krupp) . . .	..	1875	..	7·00	20	..
t.	**Hufzi-el-Rahman** .(iron)	2540	204	0	45	11	5	4½	10	14	5	1	200 nom.	2 9-in. 12-ton M.L.R. (Armstrong), 2 7-in. 6-ton do., 1 5-in. do., 6 M.	..	1868	..	12·00	200	..
c.b.	**Idjilalieh** . . .(iron)	2266	213	3	42	7	4·5	6	13	17	4	1	1800	2 9-in. 12½-ton M.L.R. (Armstrong), 3 7-in. 6-ton, 8 M.	..	1870	..	11·00	300	..
br.	**Mahmudieh** . .(iron)	6400	292	0	55	9	5	5¼	9	25	7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 6-ton do., 8 M.	..	1864	..	12·00	750	..
a.g.b.	**Meindooyeh** (was Semen-drieh) . . .(iron)	335	101	9	24	7	3	3	10	5	11	1	290	2 7-in. (Armstrong), 1 l.	..	1864	..	8·00	20	..
c.b.	**Mesoodieh** . . .(iron) (Sister to the English ship Superb)	9120	331	5	59	0	10	12	10	25	11	1	7431	12 10-in. 18-ton M.L.R. (Armstrong), 3 7-in. 6-ton do., 2 M., 6 l.	..	1874	..	13·00	600	..
„	**Muin-i-Zaffer** . .(iron)	2400	230	0	36	0	5	6	10	16	5	2	2200	4 9-in. 12-ton M.L.R. (Armstrong), 1 12-c.m. K., 1 l., 6 M.	..	1869	..	12·00	220	..
c.b.	**Mukadim-i-Hair** .(iron)	2806	236	3	39	4	6	9	10	18	1	1	3000	4 9-in. 12-ton M.L.R. (Armstrong), 2 7-in. 6-ton do., 2 l., 6 M.	..	1872	..	12·00	300	..
c.b.	**Nedjim-i-Schefket** .(iron)	2080	203	5	42	7	4½	6	9	16	5	2	1900	5 8-in. 7-ton M.L.R. (Armstrong), 2 l., 5 M.	..	1868	..	11·00	300	..
b.r.	**Orkanieh** . . .(iron)	6400	292	0	55	9	5	5¼	9	25	7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 6-ton do., 8 M.	..	1865	..	12·00	750	..
„	**Osmanieh** . . .(iron)	6400	292	0	55	9	5	5¼	9	25	7	1	3735	1 9-in. 12-ton M.L.R. (Armstrong), 17 8-in. 6-ton do., 8 M.	..	1864	..	12·00	750	..

One ironclad of 8600 tons displacement is now on the stocks building.

TURKEY.—Unarmoured Ships.

fr.cr., frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; *to.g.b.*, torpedo gunboat.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Nominal Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
g.v.	**Beyruth** . . .	609	173 6	26 7	..	12 10	1	160	1 6-in. 3-ton B.L.R., 1 4¾-in. do., 6 40-pdr.	..	1863	..	10·00	120	..
sl.	**Brussa**	800	172 6	30 6	wood	15 2	1	150	2 6-in. B.L.R., 8 4¾-in. do.	..	1859	..	11·00	120	..
„	**Edirneh** . . .	782	172 6	30 6	wood	14 2	1	150	2 6-in. 5-ton B.L.R., 10 4¾-in. do.	..	1859	..	11·00	120	..
fr.cr.	**Ertogrul**	2344	250 0	49 10	wood	23 7	1	600	21 6-in. 3-ton B.L.R., 20 4¾-in. do.	..	1863	..	10·00	350	..
gv.	**Iskenderieh** . . .	609	173 6	26 7	wood	12 10	1	160	1 6-in. 3-ton B.L.R., 1 4¾-in. do., and 6 40-pdr.	..	1863	..	11·00	120	..
sl.	**Mansureh**	800	174 10	30 6	wood	15 2	1	150	2 6-in. B.L.R., 8 4¾-in. do.	..	1863	..	11·00	120	..
„	**Mehemet Selim** . . .	1300	196 10	32 10	wood	16 6	1	450	21 6-in. 3-ton B.L.R.	..	1875	..	11·00	250	..
g.v.	**Mehrieh** . . .	609	173 6	26 7	wood	12 10	1	160	2 4¾-in. B.L.R.	..	1863	..	10·00	120	..
fr.cr.	**Mookbir-i-Sooroor** (T. Sch.)	1477	209 11	38 0	..	17 5	1	450	22 guns . . .	..	1879	..	..	..	..
sl.	**Muzafer**	800	174 10	30 6	wood	15 2	1	150	2 6-in. 5-ton B.L.R., 10 4¾-in. do.	..	1863	..	12·00	150	..
„	**Sedul Bahr** . . .	609	173 6	26 7	wood	12 10	1	160	2 4¾-in. B.L.R. . .	..	1859	..	10·00	120	..
fr.cr.	**Selimieh**	4717	279 10	59 0	wood	23 7	1	600	25 6-in. 3-ton B.L.R., 24 4¾-in. do.	..	1865	..	10·00	350	..
sl.	**Sinope**	800	172 0	30 6	wood	15 0	1	150	1 6-in. 5-ton B.L.R., 8 4¾-in. do.	..	1859	..	10·00	120	..
to. g. b.	Not named	900	230 0	31 0	steel	16 6	..	4500	2 10½-c.m. B.L.R. (Krupp), 6 8¼-c.m. do.	4 f. tu. or l.car	1890	..	19·00	..	..
„	Not named	260	200 0	20 3	steel	8 0	2	2700	1 4-in. B.L.R., 6 M.	..	Bldg.	..	21·00	..	..
g.v.	**Uthared**	609	173 6	26 7	wood	12 10	1	160	2 4¾-in. B.L.R. . .	..	1863	..	10·00	120	..
„	**Zuhaf**	609	173 6	26 7	wood	12 10	1	160	2 4¾-in. B.L.R. . .	..	1862	..	10·00	120	..
sl.	Two not named . . .	1960	226 0	37 0	composite	14 0	1	2500	2 6-in. 5-ton B.L.R., 4 4¾-in. do.	..	1890	..	14·00	..	..
„	Not named	1160	210 0	35 0	composite	14 0	1	1800	2 6-in. 5-ton B.L.R., 4 4¾-in. do.	..	Bldg.	..	14·00	..	..

27 *Despatch Vessels and Yachts.*—Ainaly-Kawak (Paddle), Arcadia, Candia, Chania, Esser-i-Djidid, Esser-i-Neiseret, Faiz-i-Bahri, Fevaid, Iksan (Paddle), Ismail, Izzedin, Moodar-î-Zaffer, Monassir Noodoosche-i-Reisan, Peih-i-Tidjaret, Rethimo, Rhodos (Paddle), Sahir, Seyar, Seyar-i-Derja Soolhie, Stamboul, Stankio (Paddle), Sultanieh, Surreya, Syrat (Paddle), Thalia of 194 tons to 1512 tons displacement, and 50 HP. to 800 HP. About one-half of these vessels are built of wood.

4 *Gunboats.*—Akha, Frat, Shefket-Numa, and Shat, of 200 tons displacement and 60 HP., and about 10 knots speed.

Torpedo-boats.—In addition to the two torpedo-gunboats given in the alphabetical list of unarmoured vessels, there are 19 first-class torpedo-boats built and building, 8 of 88 tons and of 20 to 22 knots speed, and the remaining eleven of 43 tons displacement and 20 knots speed.

There are also, in addition to the vessels named in the lists, screw and paddle transports and store ships, harbour ships and vessels, tugs, &c., &c.

UNITED STATES.—Armoured Ships.

t., turret ship, *a. c.*, armoured cruizer; *c.s., t.*, coast-service turret ship; *to. ram*, torpedo ram; f. tu., or l. car., fixed tube, or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour.		Backing.	Mean Draught of Water.		Propeller.	Indicated Horse power.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
							Belt.	Turret or Battery.						Guns.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.s., t.	**Ajax** (1 turret) (iron).	2100	226	4	43	7	5	11	..	13	9	1	340	2 15-in. 19-ton smooth-bores .	..	1864	125,000	6·00	160	..
to. ram	**Alarm** (iron) . .	720	172	6	29	3	4 (on traverse)	..	16	11	2	1	800	1 15-in. smooth-bore . .	..	1873	..	11·00	..	..
c.s., t.	**Amphitrite** (2 t.) . (iron)	3815	249	4	55	9	7	11½	..	14	3	2	1600	4 10½ 25-ton B.L.R., 2 Q.F., 4 M.	..	1885 (rebuilt)	..	12·00	300	1800
„	**Camanche** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	125,000	6·00	160	..
„	**Canonicus** (1 t.) (iron)	2100	226	4	43	7	5	11	..	13	9	1	320	2 15-in. 19-ton smooth-bores .	..	1864	125,000	6·00	160	..
„	**Catskill** (1 t.) (iron) .	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	..	6·00	150	..
„	Coast Defence ship .	4000	250	0	59	0	16	16–14	..	14	6	2	5400	1 16-in. 115-ton B.L.R., 1 12-in. 48-ton do., 1 15-in. dynamite gun, 15 Q.F.	..	to be built	..	..	..	..
„	Coast Defence ship .	[illegible]500	..		..		..	..	..	..		2	..	.. ..	..	to be built.	..	..	..	..
c.s., t.	New ship (steel) .	3000	..		..		..	..	..	..		2	7500	.. ..	..	to be built.	300,000	17·00	..	..
to. ram	**Intrepid** (iron) . .	1123	170	7	36	0	5	..	14	11	10	2	800	.. ..	..	1874	..	9·00	..	..
c.s., t.	**Jason** (1 t.) (iron) .	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1864	..	6·00	150	..
„	**Lehigh** (1 t.) (iron) .	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1864	..	6·00	150	..
„	**Mahopac** (1 t.) (iron)	2100	226	4	43	7	5	10	..	13	9	1	320	2 15-in. 19-ton smooth-bores .	..	1865	..	6·00	160	..
a. c., t.	**Maine** (2 t.) (steel)	6648	310	0	57	0	11	10½	2-in. st. dk.	21	6	2	9000	4 10-in. 26-ton B.L.R., 6 6-inch do., 8. Q.F., 17 M.	7 f. tu. or l. car.	Bldng.	517,600	17·00	850	7000
c. s., t.	**Manhattan** (1 t.) (iron)	2100	226	4	43	7	5	10	..	13	9	1	320	2 15-in. 19-ton smooth-bores .	..	1865	..	6·00	160	..

UNITED STATES.—Armoured Ships—*continued.*

t., turret ship; *a.c.*, armoured cruiser; *c.s.*, *t.*, coast service turret ship; *to. ram*, torpedo ram; f. tu. or l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.		Beam.		Armour. Belt.	Armour. Turret or Battery.	Backing.	Mean Draught of Water.		Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	inches.	inches.	inches.	ft.	in.						£	knots.	tons.	knots.
c.s, t.	**Miantonomoh** (2 t.). (iron)	3815	249	4	55	9	7	11½	8	14	3	2	1600	4 10½-in. 25-ton B.L.R., 2 Q.F., 4 M.	..	1885 (rebuilt)	272,000	10·50	330	1800
,,	**Monadnock** (2 t.) . (iron	3815	249	4	55	9	7	11½	8	14	3	2	1600	4 10½-in. 25-ton B.L.R., 2 Q.F., 4 M.	..	1885 (rebuilt)	272,000	12·00	330	1800
,,	**Montauk** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1864	..	5·50	160	..
c.s., t.	**Nahant** (1 t.) (iron) .	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	..	6·00	160	..
,,	**Nantucket** (1 t.) (iron)	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	..	5·60	160	..
,,	**Passaic** (1 t.) (iron) .	1875	200	2	45	11	5	11	..	11	6	1	350	2 15-in. 19-ton smooth-bores .	..	1863	..	6·00	160	..
,,	**Puritan** (2 t.) (iron) .	6060	280	0	60	0	12	11½	..	18	1	2	3700	4 10½-in. 25-ton B.L.R., 4 Q.F., 4 M.	..	1885 (rebuilt)	..	13·00	580	..
,,	**Terror** (2 t.) (iron) .	3815	249	4	55	9	7	11½	8	14	3	2	1600	4 10½-in. 25-ton B.L.R., 2 Q.F., 4 M.	..	1885 (rebuilt)	206,800	12·00	330	1800
t.	**Texas** (2 t.) (steel) .	6300	290	0	64	0	12	12	3 in. steel dk.	22	6	2	8600	2 12-in. 46-ton B.L.R., 6 6-in. do., 8 Q.F., 4 M.	6 f. tu. or l. car	Bldg.	495,000	17·00	850	7000
c.s., t.	**Wyandotte** (1 t.) (iron)	2100	225	0	43	7	5	10	..	13	6	1	320	2 15-in. 19-ton smooth-bores	..	1864	..	6·00	160	..

For new programme of armoured ships to be built, see Chap. XI.

UNITED STATES: Unarmoured Ships.

corv., corvette; *cr.*, cruiser; *d.v.*, despatch-vessel; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; P., deck protected throughout; *p.p.*, partial deck protected; f. tu. or l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots.	tons.	knots.
sl.	Adams . . .	1375	183 9	36 0	wood	14 2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. M.L.R., 2 l., 3 M.	..	1874	..	9·00	140	..
g.v.	Alert	1020	173 10	31 10	iron	12 10	1	656	1 8-in. $7\frac{3}{4}$-ton smooth-bore, 2 9-in. 4-ton do., 1 60-pdr. B.L.R.	..	1874	..	9·00	140	..
sl.	Alliance . . .	1375	183 9	36 0	wood	14 2	1	774	1 8-in. 8-ton M.L.R., 4 9-in. 4-ton do., 1 60-pdr. M.L.R., 2 l., 1 M.	..	1875	..	9·00	130	..
cr.	Atlanta . . *p.p.*	3189	270 0	42 0	steel	17 0	1	3511	2 8-in. $11\frac{3}{4}$-ton B.L.R., 6 6-in. 5-ton do., 4 Q.F., 8 M.	..	1884	123,600	16·33	400	5000
,,	Baltimore . P.	4413	315 0	48 6	,,	19 6	2	10750	4 8-in. $11\frac{3}{4}$-ton B.L.R., 6 6-in. 5-ton do., 6 Q.F., 7 M.	5 f. tu. or l.car	1888	210,000	19·00	900	12000
,,	Bennington (was Gun-boat No. 3)	1700	230 0	36 0	,,	14 0	2	3400	6 6-in. B.L.R., 4 Q.F., 5 M. . . .	..	Building	98,000	16·00	400	9000
,,	Boston . . *p.p.*	3189	270 0	42 0	,,	17 0	1	3780	2 8-in. $11\frac{3}{4}$-ton B.L.R., 6 6-in. 5-ton do., 4 Q.F., 8 M.	..	1884	123,200	15·00	780	5000
fr. cr.	Brooklyn . .	3000	232 11	42 7	wood	19 4	1	1165	12 9-in. 4-ton smooth-bores, 1 8-in. do., 1 60-pdr. B.L.R., 8 M.	..	1858	..	10·00	275	..
,,	Charleston . P.	3730	300 0	46 0	steel	18 6	2	7500	2 8-in. B.L.R., 6 6-in. 5-ton do., 4 Q.F., 9 M.	4 f. tu. or l.car	1888	..	18·00	800	..
,,	Chicago . . *p.p.*	4500	315 0	48 2	,,	19 0	2	5000	4 8-in. B.L.R., 8 6-in. do., 2 5-in. do., 2 Q.F., 10 M.	..	1885	177,800	15·00	940	6000
cr.	Concord (was Gun-boat No. 4) . . .	1700	230 0	36 0	,,	14 0	2	3400	6 6-in. B.L.R., 4 Q.F., 5 M. . . .	..	Building	98,000	16·00	400	9000
d.v.	Dolphin . . .	1485	239 6	31 10	,,	14 2	1	2300	1 6-in. 5-ton B.L.R., 2 Q.F., 4 M. . .	..	1884	61,000	15·50	310	..
sl.	Enterprise . .	1375	183 9	36 0	wood	14 2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. do. M.L.R., 9 l., 1 M.	..	1874	..	10·00	140	..

UNITED STATES.—Unarmoured Ships—*continued.*

corv., corvette; *cr.*, cruiser; *fr.cr.*, frigate-built cruiser; *g.v.*, gun-vessel; *sl.*, sloop; P., deck protected throughout; *p.p.*, partial deck protected; f. tu. or l. car., fixed tube or launching carriage for discharging Fish torpedoes.

Class.	NAME.	Displacement.	Length.	Beam.	Material of Hull.	Mean Draught of Water.	Propeller.	Indicated Horse-power.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.		ft. in.						£	knots	tons.	knots.
l.	Essex	1375	183 9	36 0	wood	14 2	1	800	1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr. M.L.R., 2 l., 1 M.	..	1874	..	10·00	140	..
corv.	Galena	1900	216 6	36 0	„	16 5	1	940	1 8-in. 8-ton B.L.R., 6 9-in. 4-ton smooth-bores, 1 60-pdr. B.L.R., 4 l., 1 M.	..	1877	..	10·00	125	..
fr. cr.	Hartford	2900	226 4	42 7	„	18 4	1	1024	12 9-in. 4-ton smooth-bores, 1 8-in. 8-ton do., 4 M., 2 l.	..	1858	..	9·00	241	..
corv.	Iroquois	1575	200 2	32 10	„	15 1	1	813	1 11-in. 7½-ton smooth-bore, 5 8-in. 4-ton do., 1 60-pdr. M.L.R., 1 l., 1 M.	..	1858	..	8·00	128	..
„	Juniata	1900	203 5	39 4	„	16 5	1	1304	1 8-in. 8-ton smooth-bore, 6 9-in. 4-ton do., 1 60-pdr., 4 l., and 1 M.	..	1862	..	9·00	235	..
„	Kearsarge	1550	196 10	32 10	„	15 9	1	822	2 8-in. 8-ton smooth-bores, 4 9-in. 4-ton do., 1 60-pdr. B.L.R., 1 l., 1 M.	..	1861	..	9·00	165	..
fr. cr.	Lancaster	3250	236 3	45 11	„	19 1	1	2000	10 8-in. smooth-bores, 8 M.	..	1859	..	9·60	288	..
corv.	Marion	1900	216 6	37 0	„	16 5	1	1172	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton M.L.R., 1 60-pdr. B.L.R., 3 l., 1 M.	..	1873	..	11·00	156	..
corv.	Mohican	1900	216 6	37 0	„	16 5	1	1172	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton B.L.R. 1 60-pdr. B.L.R., 2 l., 3 M.	..	1882	..	11·00	160	..
fr. cr.	Newark . P.	4083	310 0	49 0	steel	18 9	2	8500	12 6-in. 5-ton B.L.R., 4 6-pdr. Q.F., 9 M.	6 f. tu. or l.car	Building	250,000	18·00	850	10,500
„	New York	4527	314 11	45 11	wood	..	1	8500	.. ..	..	Building since 1865		17·50	900	..
sl.	Nipsic	1375	183 9	36 0	„	14 2	1	1375	4 9-in. 4-ton smooth-bores, 1 8-in. 8-ton do., 1 60-pdr. M.L.R., 2 l., 1 M.	..	1878	..	11·00	180	..
fr. cr.	Omaha	2400	249 4	39 4	„	16 5	1	1150	10 9-in. 4-ton smooth-bores, 1 8-in. 8-ton do., 1 60-pdr. [illegible] 5 M.	..	1868	..	12·00	150	..
corv.	Ossipee	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

fr. cr.	**Pensacola** . . .	3000	229	7	42	7	„	18	9	1	1165	2 9-in. 8-ton smooth-bore, 2 80-pdr. B.L.R. do., 2 60-pdr. do., and 4 M.	..	1859	..	9·00	310	..
cr.	**Petrel** (was Gun-boat No. 2)	890	175	0	31	0	steel	11	7	1	1300	4 6-in. B.L.R., 2 3-pdr. Q.F., 5 M. . .	..	1888	50,000	13·0	160	..
cr.	**Philadelphia** (was Cruiser No. 4) . P.	4413	315	0	48	6	„	19	3	2	10,500	4 8-in. B.L.R., 6 6-in. do., 6 Q.F., 7 M. .	5 f. tu. or l. car	Building	265,000	19·0	..	..
corv.	**Quinnebaug** . .	1900	216	6	36	0	wood	16	5	1	1103	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton B.L.R. 1 60-pdr. B.L.R., 3 l.	..	1875	..	9·00	160	..
g.v.	**Ranger** (Surveying) .	1020	173	10	31	10	iron	12	10	1	656	1 60-pdr. M.L. Parrott	..	1874	..	8·00	127	..
fr. cr.	**Richmond** . .	2700	226	4	42	7	wood	17	4		1078	12 9-in. 4-ton smooth-bore, 1 8-in. 8-ton do., 1 60-pdr. M.L.R., 2 l., and 6 M.	..	1860	..	9·00	290	..
cr.	**San Francisco** (was Cruiser No. 5) . P.	4083	310	0	49	2	steel	18	9	2	10,500	12 6-in. B.L.R., 6 Q.F., 7 M.	6 f. tu. or l. car	Building	270,000	19·0	..	..
corv.	**Swatara** . . .	1900	216	6	36	0	„	16	5	1	1176	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton B.L.R. 1 60-pd. B.L.R., 4 l., 1 M.	..	1873	..	9·00	186	..
fr. cr.	**Trenton** . . .	3900	252	7	49	3	wood & iron	20	4	1	3100	11 8-in. 8-ton M.L.R. (Palliser's), 6 l. .	..	1876	..	12·80	342	..
corv.	**Vandalia** . . .	2100	216	6	39	4	wood	17	4	1	1176	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton B.L.R. 1 60-pdr. B.L.R., 3 l., 3 M.	..	1874	98,726	10·00	218	..
cr.	**Vesuvius** (Dynamite Gun Cruiser)	725	246	0	26	6	„	9	0	2	3200	3 dynamite guns, 10½ in. cal., 2 Q.F., 5 M.	..	1888	70,000	20·00	28	..
g.v.	**Yantic** . . .	900	180	5	29	6	„	12	2	1	670	1 8-in. 8-ton smooth-bore, 2 9-in. 4-ton do., 1 60-pdr. M.L.R., 2 l. 1 M.	..	1878	..	8·00	125	..
cr.	**York Town** (was Gun-boat No. 1)	1700	230	0	36	0	steel	14	0	2	3400	6 6-in. B.L.R., 4 Q.F., 5 M. . . .	..	1888	98,000	16·0	400	9000

For the programme of new Unarmoured Ships to be built, see Chap. xi.

Paddle steamers.—Michigan (685 tons and 300 horse-power), Monocacy (1370 tons and 850 horse-power), Powhattan (3980 tons), Tallapoosa (1270 tons and 1100 horse-power).

Steamers (fourth-rate).—Despatch (560 tons, 402 I.HP.); Palos (420 tons and 350 horse-power); Fortune, Leyden, Mayflower, Nina, Pinta, Speedwell, Standish, Triana (each 450 tons and 440 I.HP.); Catalpa (190 tons), Cohasset (450 tons), and Rescue (90 tons).

Torpedo-boats.—Three torpedo-boats, 136 feet long, 14 feet wide, 100 tons displacement, 1600 I.HP., and 22 knots speed; two 128 feet long, and one 108 feet.

Submarine torpedo-boats.—Nautilus, built in London, and The Peacemaker, built in America.

Surveying ships, training ships, store ships, harbour ships, tugs, &c., are not included in the above lists.

URUGUAY.

Gunboats.—General Artiga, 274 tons, 520 I.HP., 12½ knots speed, 2 12-c.m. B.L.R. (30 calibres, Krupp), 2 M.

General Rivera, 300 tons, 12 knots speed, and having an armament of 1 15-c.m. B.L.R., 1 6-c.m. ditto, and the General Jaurez (was Tastique).

Also an iron steamer of 400 tons displacement, the Malvinias, built at Elbing in 1882.

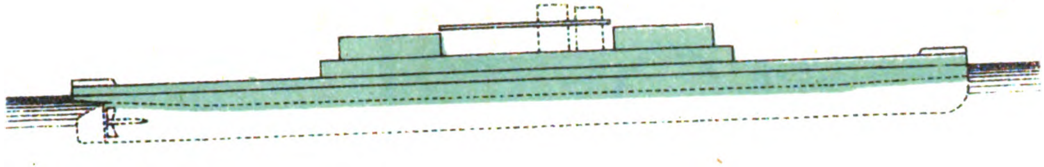
VENEZUELA.

Steamer.—Augusta, iron, launched in 1884.

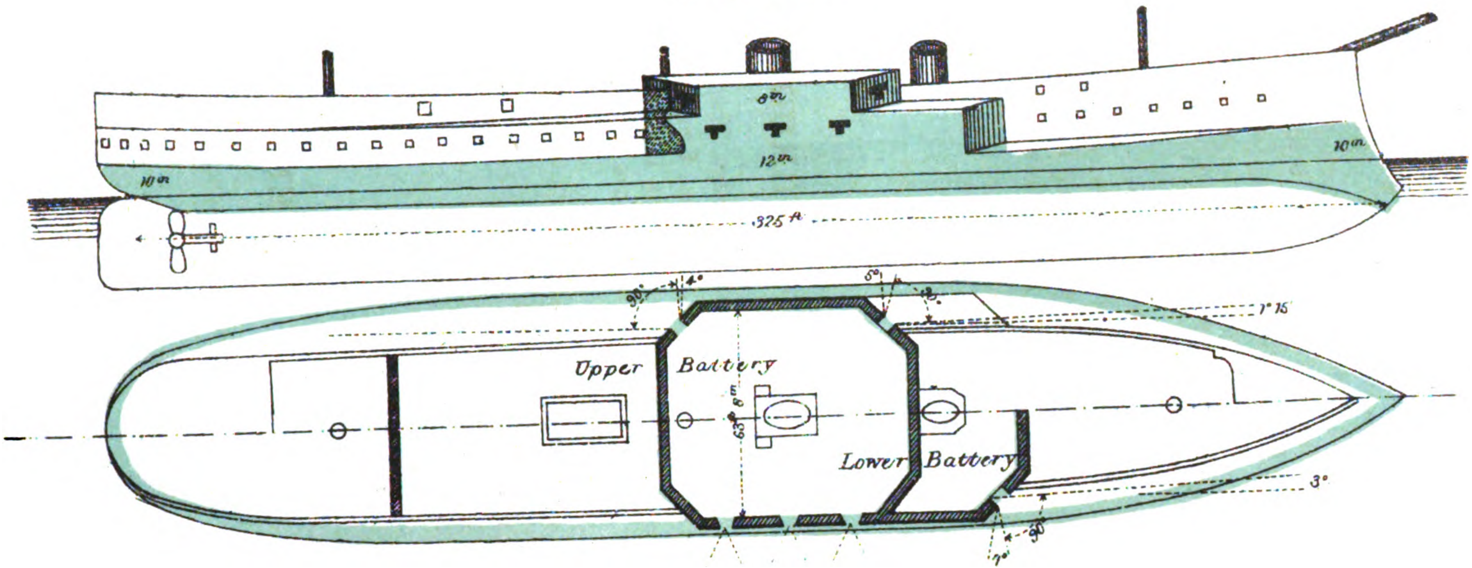
BRITISH SHIPS.

Pl. 1

"Abyssinia." (Indian Marine)



"Alexandra."

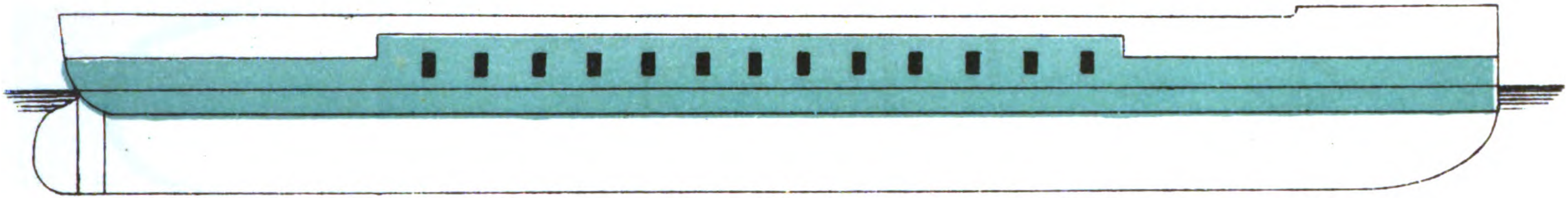


HANHART LITH

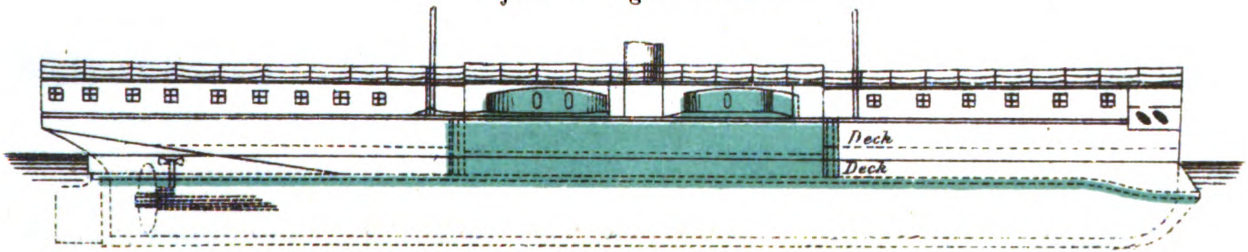
Pl. 2

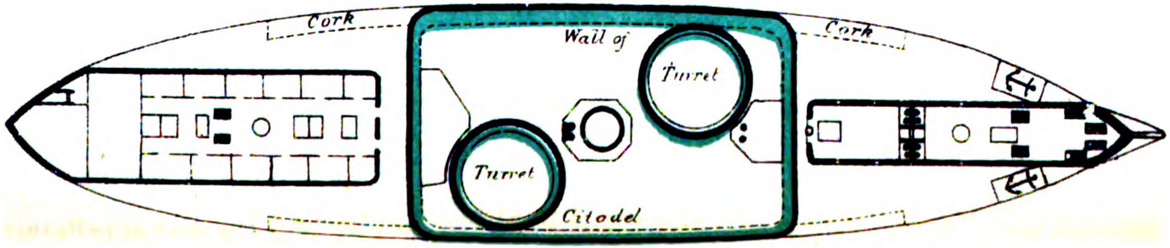
BRITISH SHIPS.

"Achilles."



"Ajax" & "Agamemnon".



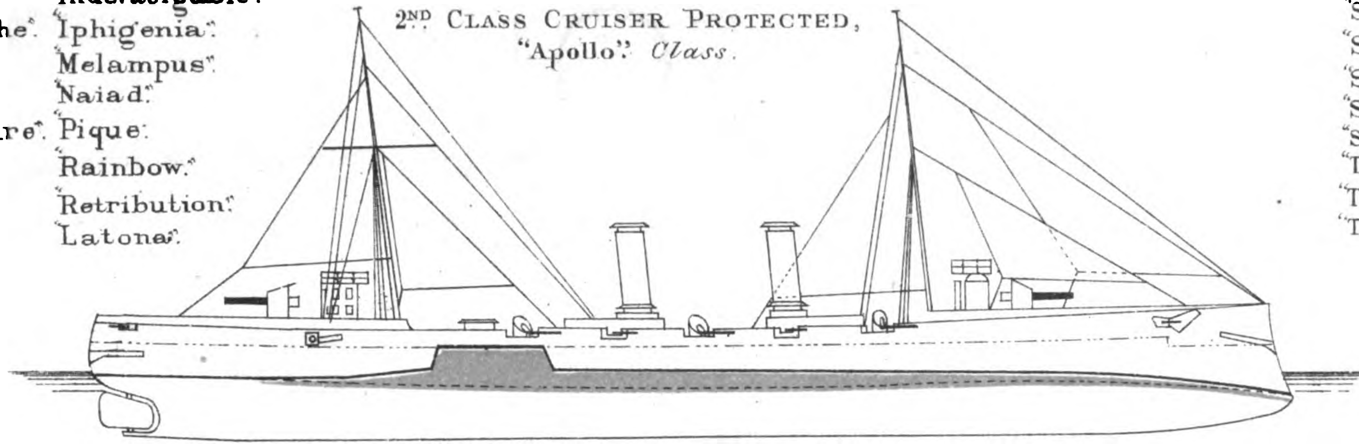


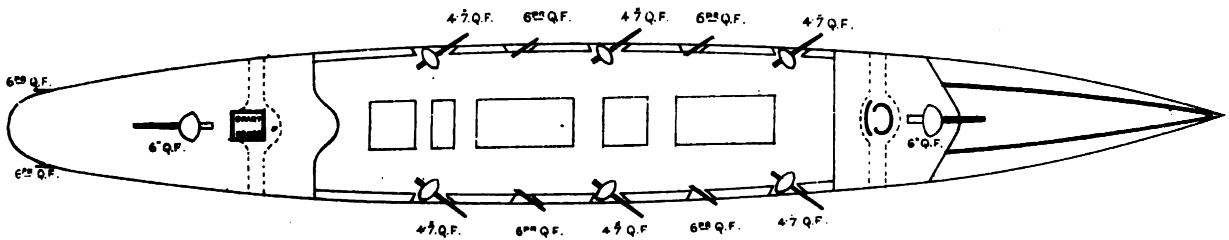
BRITISH SHIPS.

2ND CLASS CRUISER PROTECTED,
"Apollo." *Class*.

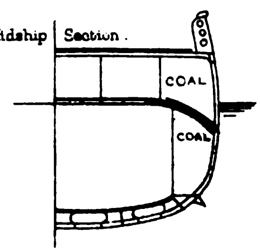
"Æolus." "Indefatigable."
"Andromache." "Iphigenia."
"Apollo." "Melampus."
"Astrea." "Naiad."
"Bonaventure." "Pique."
"Brilliant." "Rainbow."
"Cambrian." "Retribution."
"Intrepid." "Latona."

"Sappho."
"Scylla."
"Sirius."
"Spartan."
"Sybille."
"Terpsichore."
"Thetis."
"Tribune."





Midship Section.

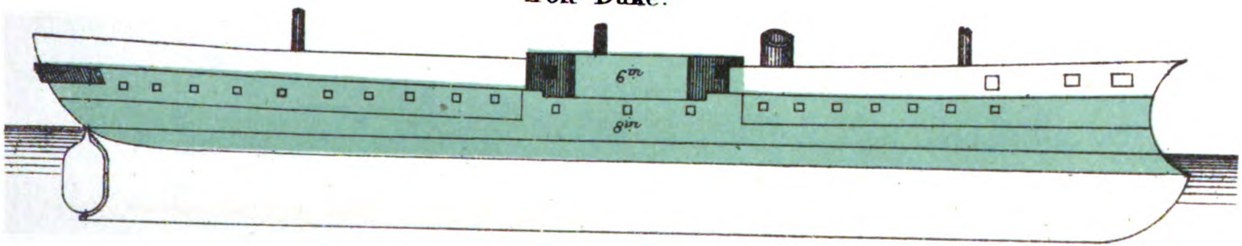


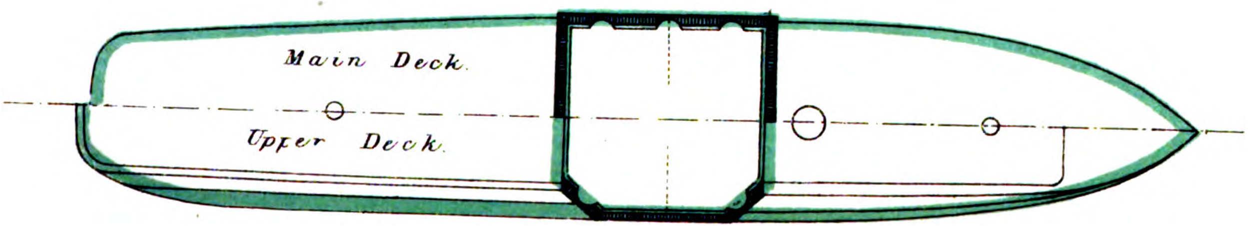
Special Scale

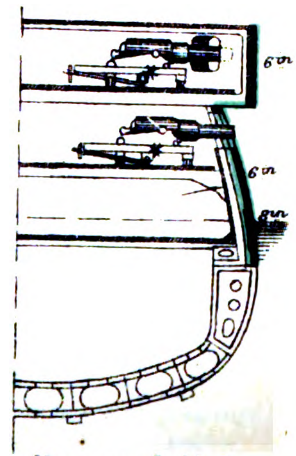
Pl 4.

BRITISH SHIPS.

"Audacious."
Invincible
Iron Duke.

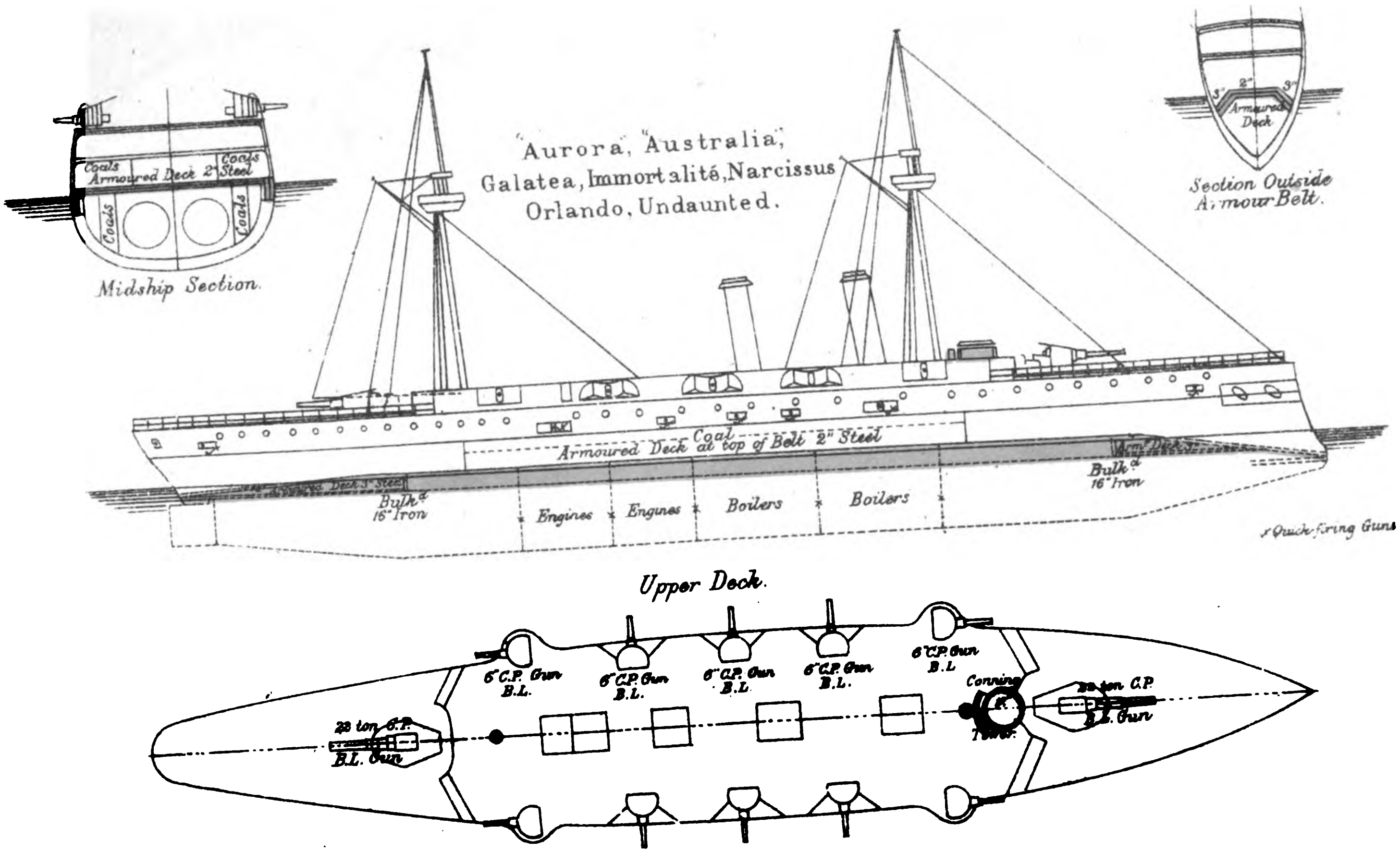






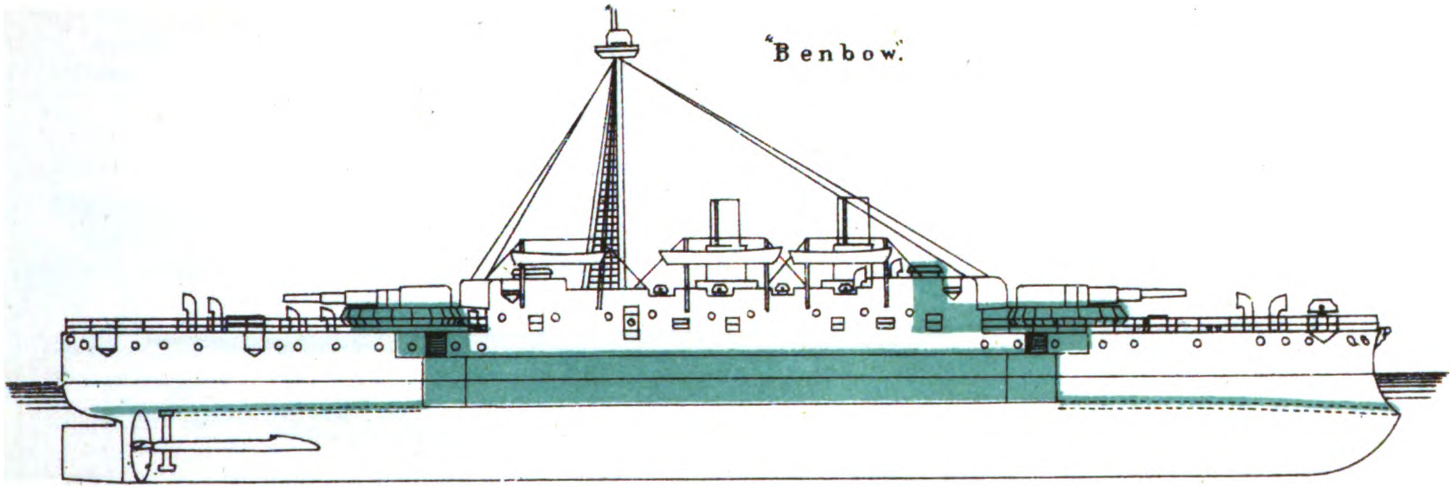
Upper and Main
Batteries,
"Audacious" Class

BRITISH SHIPS.

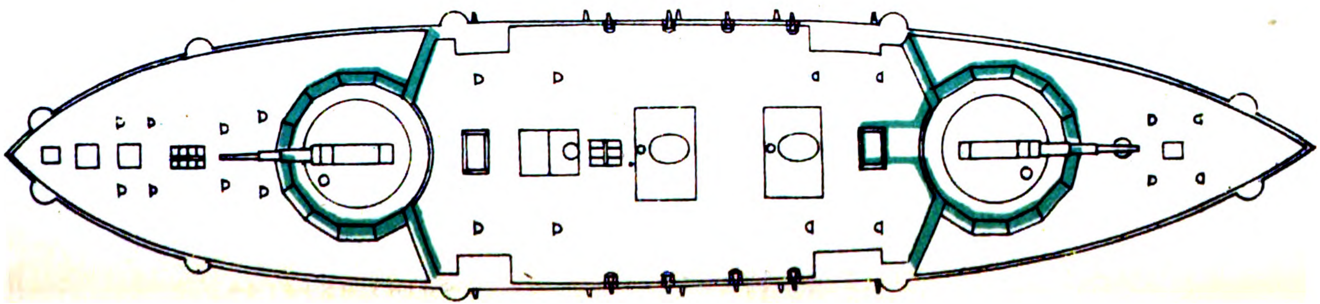


BRITISH SHIPS.

"Benbow."



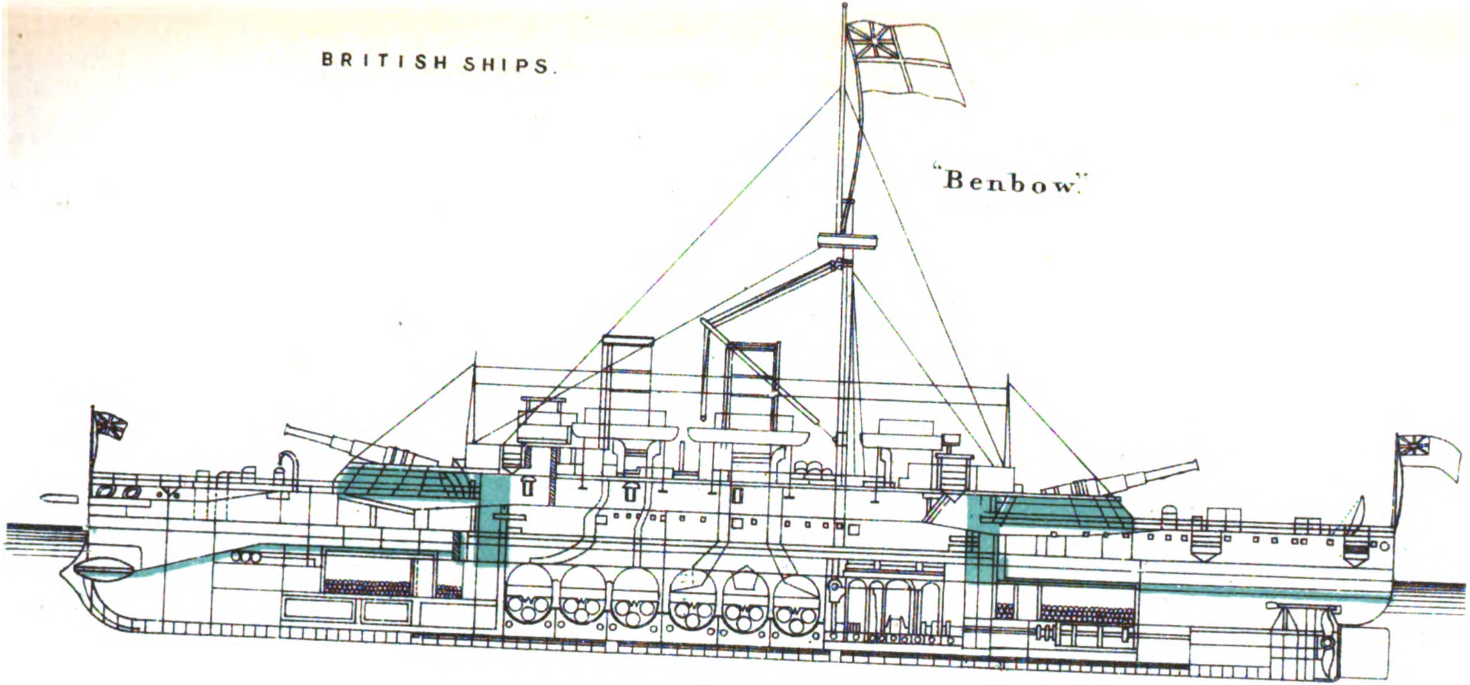
Spar Deck.



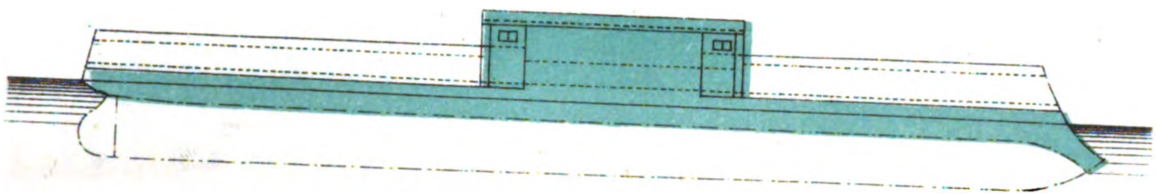
Pl. 7

BRITISH SHIPS.

"Benbow."



"Belleisle & Orion."



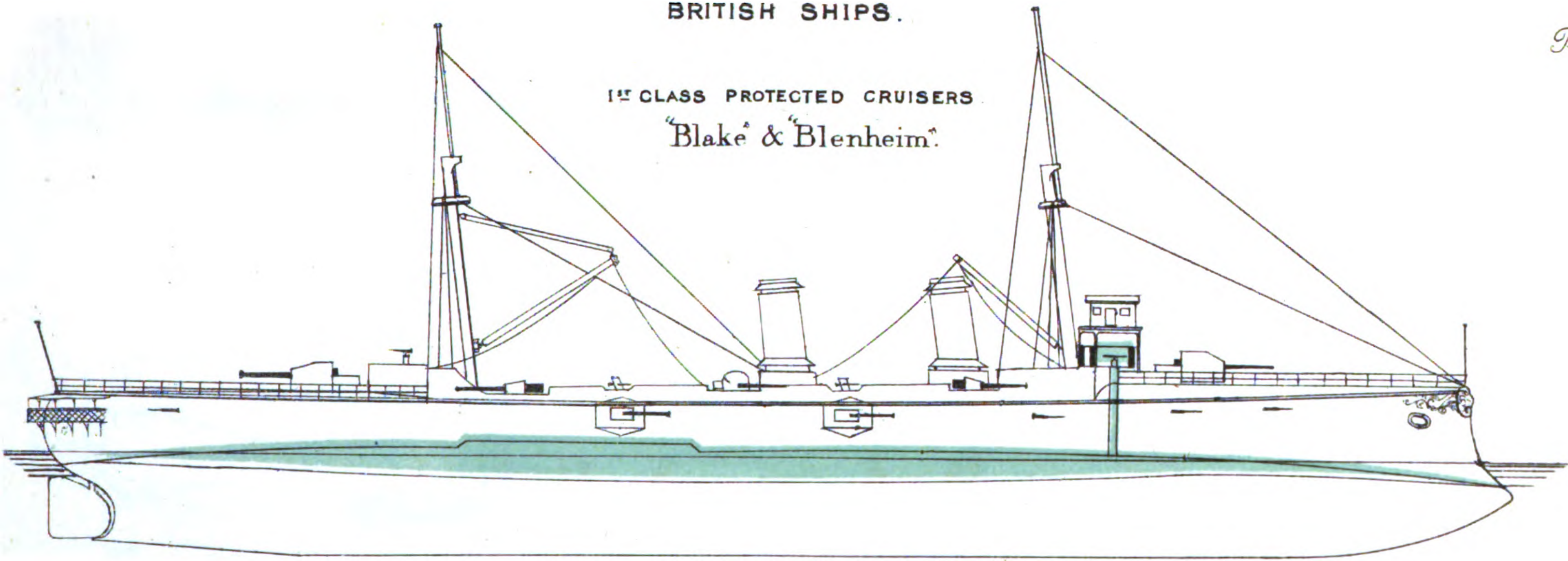
HANHART LITH

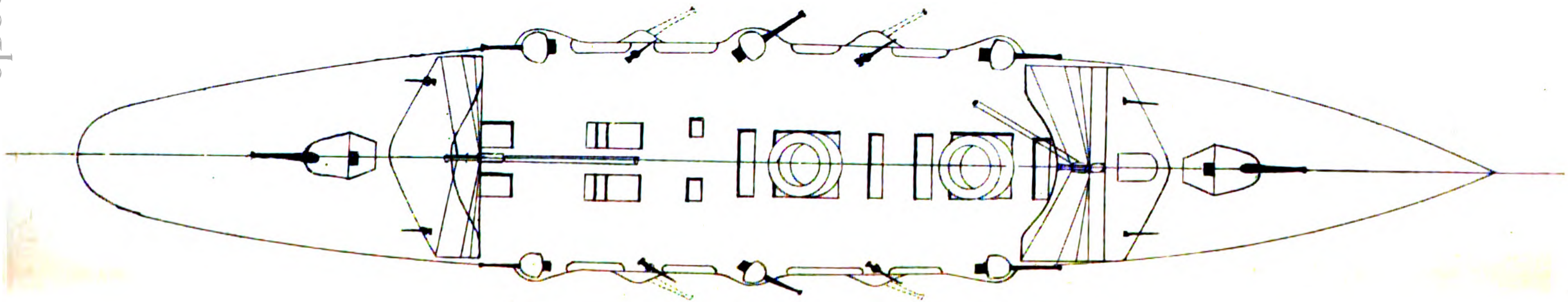
Pl. 8.

BRITISH SHIPS.

1st CLASS PROTECTED CRUISERS

"Blake" & "Blenheim".

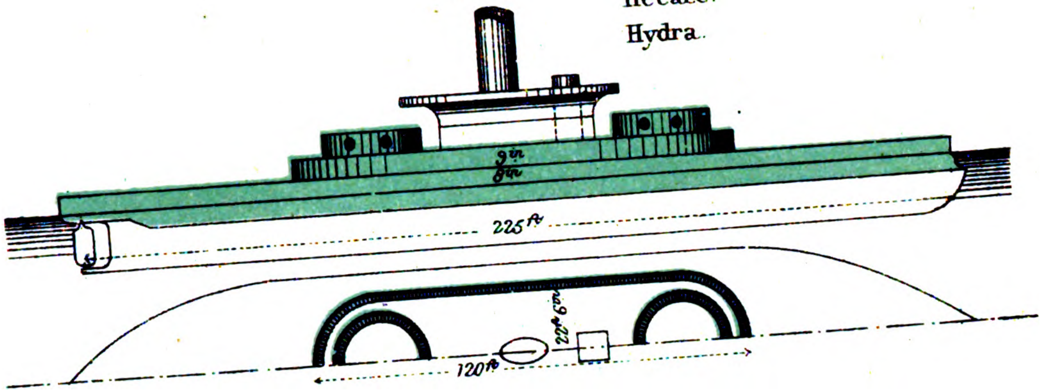




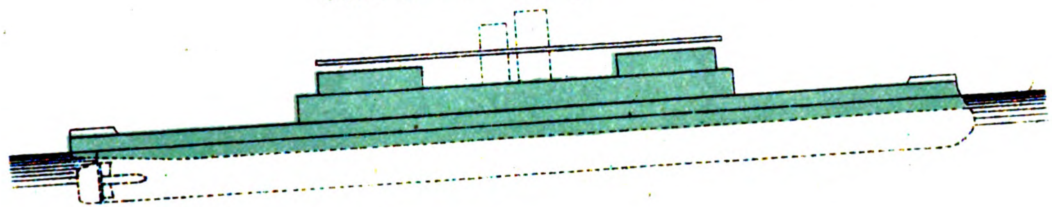
Hanhart Lith

BRITISH SHIPS.

"Cyclops." Gorgon. Hecate. Hydra.



"Cerberus" & "Magdala." (Colonial & Indian Marine respect^ly)

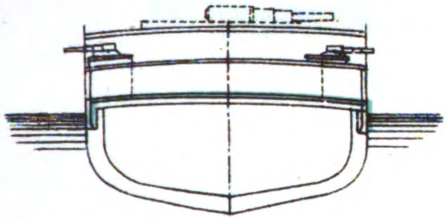


HANHART LITH.

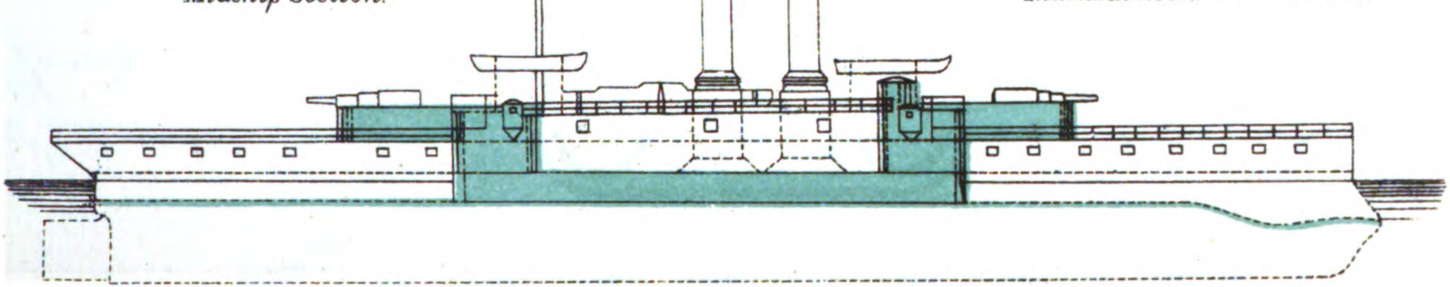
BRITISH SHIPS.

Pl. 10.

H.M.S. 'Collingwood',
also on slightly different dimensions Howe,
Rodney, Anson & Camperdown.

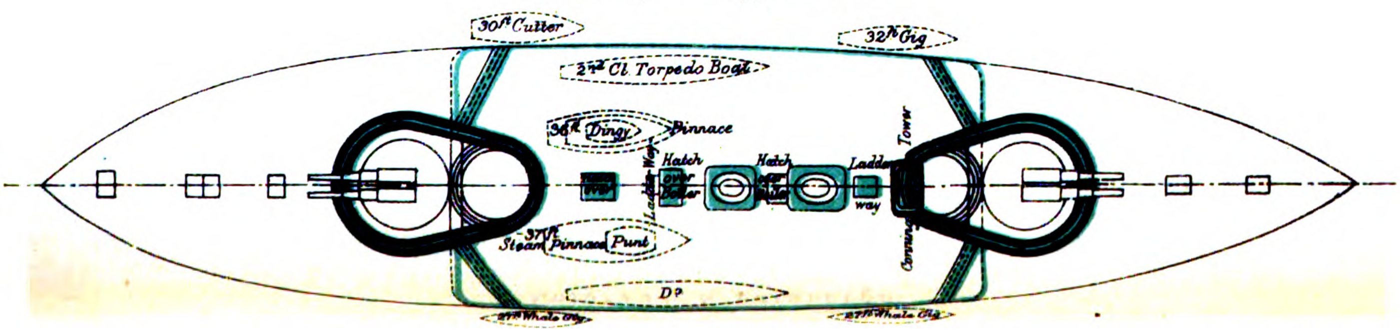


Midship Section.



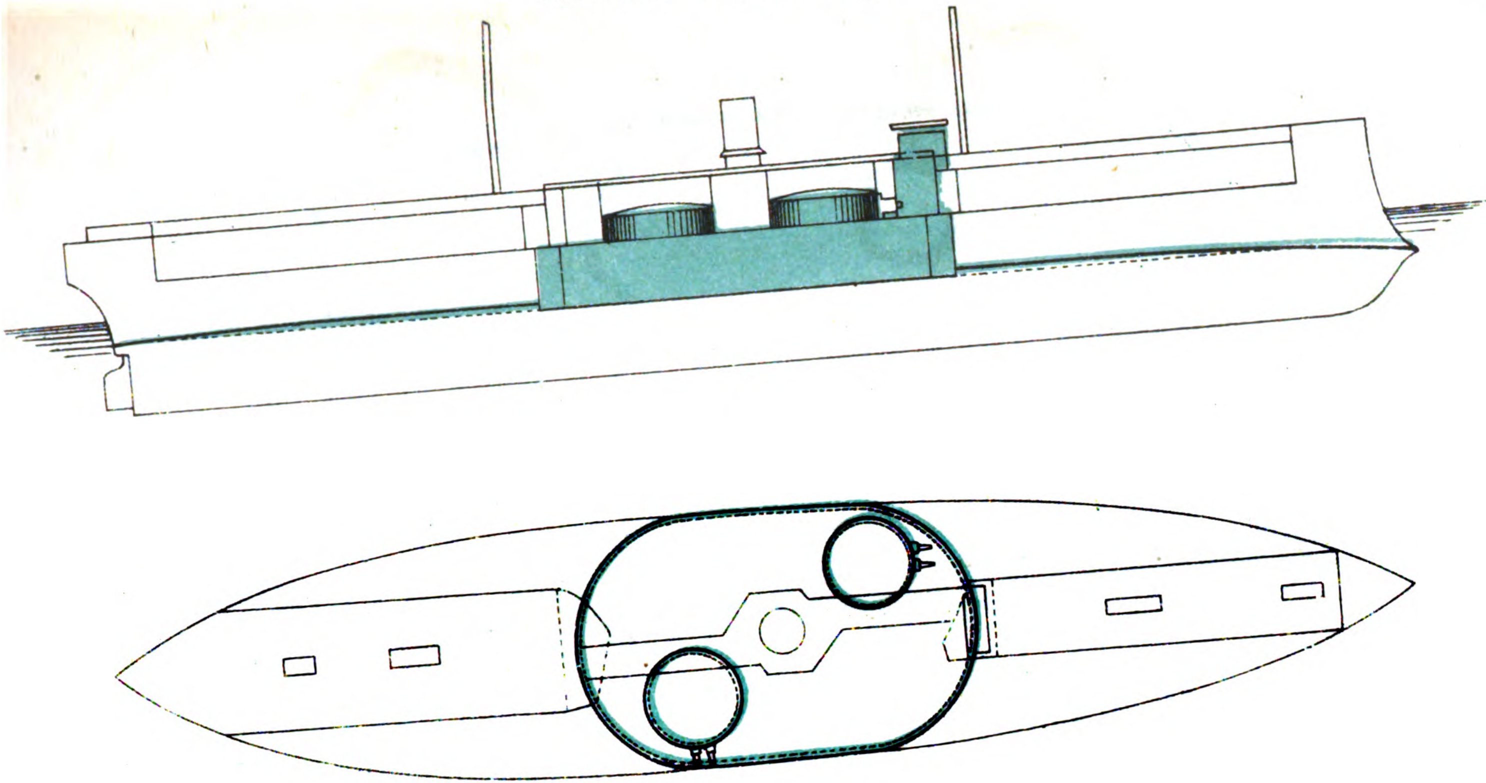
Length between the Perpendicular	325 0
Breadth extreme	68 0
Displacement in Tons	9150
Indicated Horse Power	7000

Plan of Spar & Upper Decks.



Pl. 11.

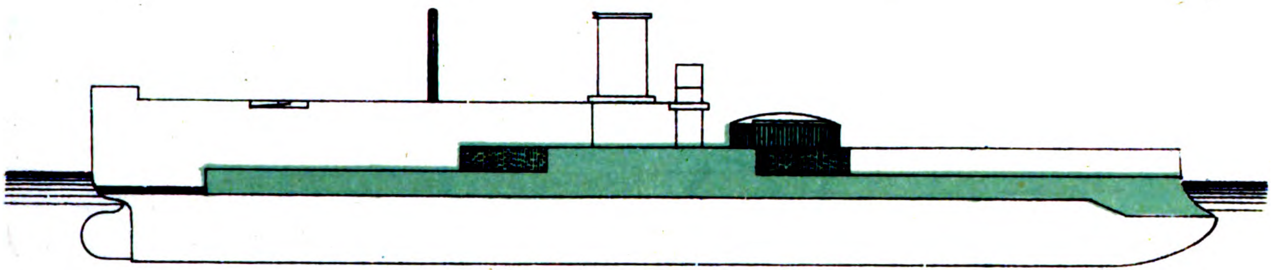
"Colossus" & "Edinburgh."

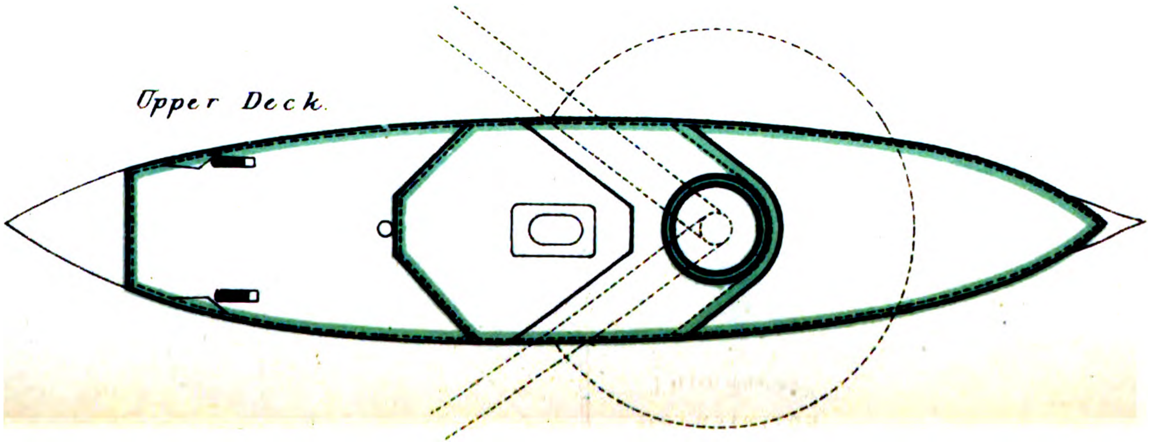


HANHART LITH.

BRITISH SHIPS.

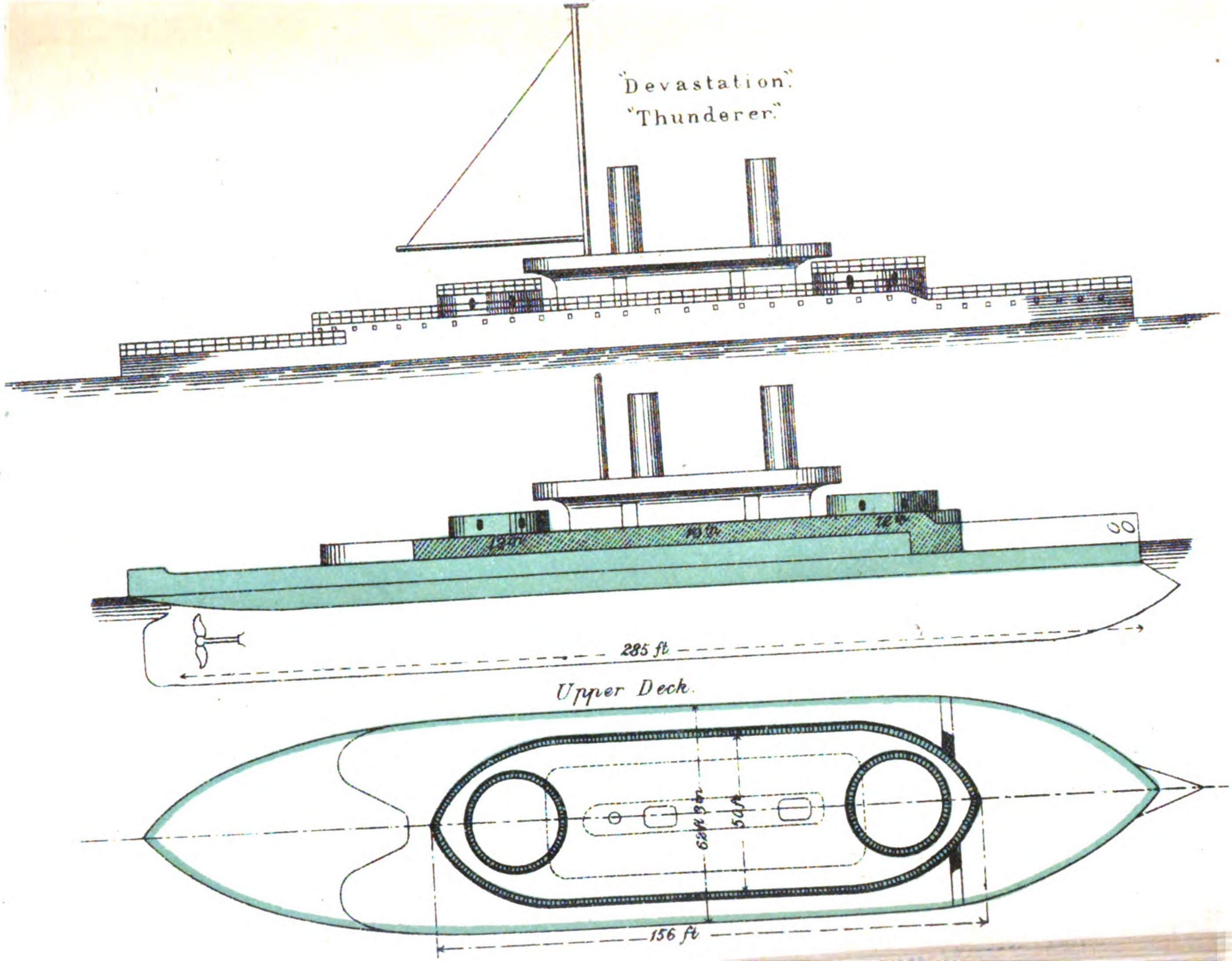
"Conqueror" & "Hero".



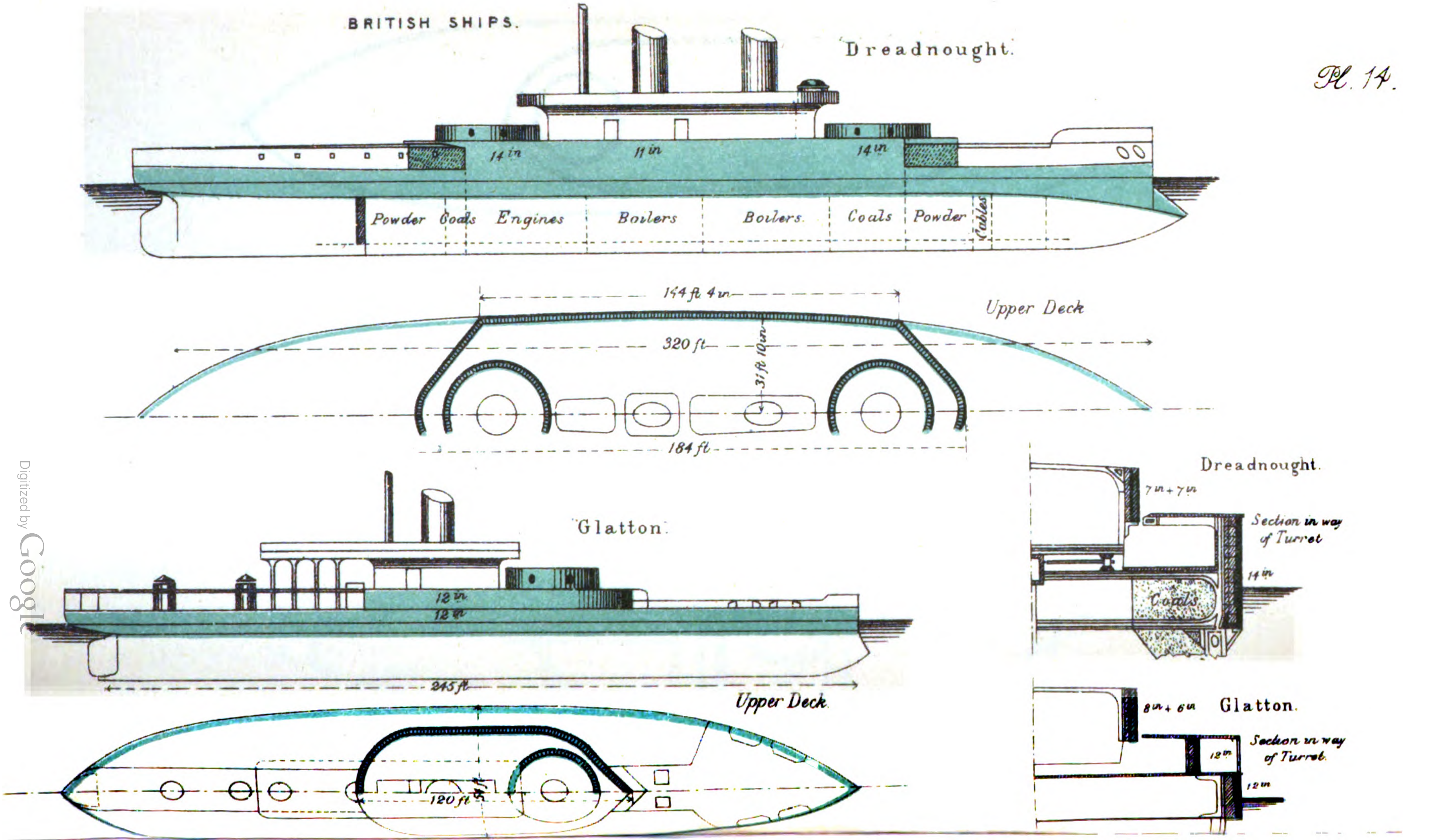


HANHART LITH

"Devastation."
"Thunderer."



HANHART LITH



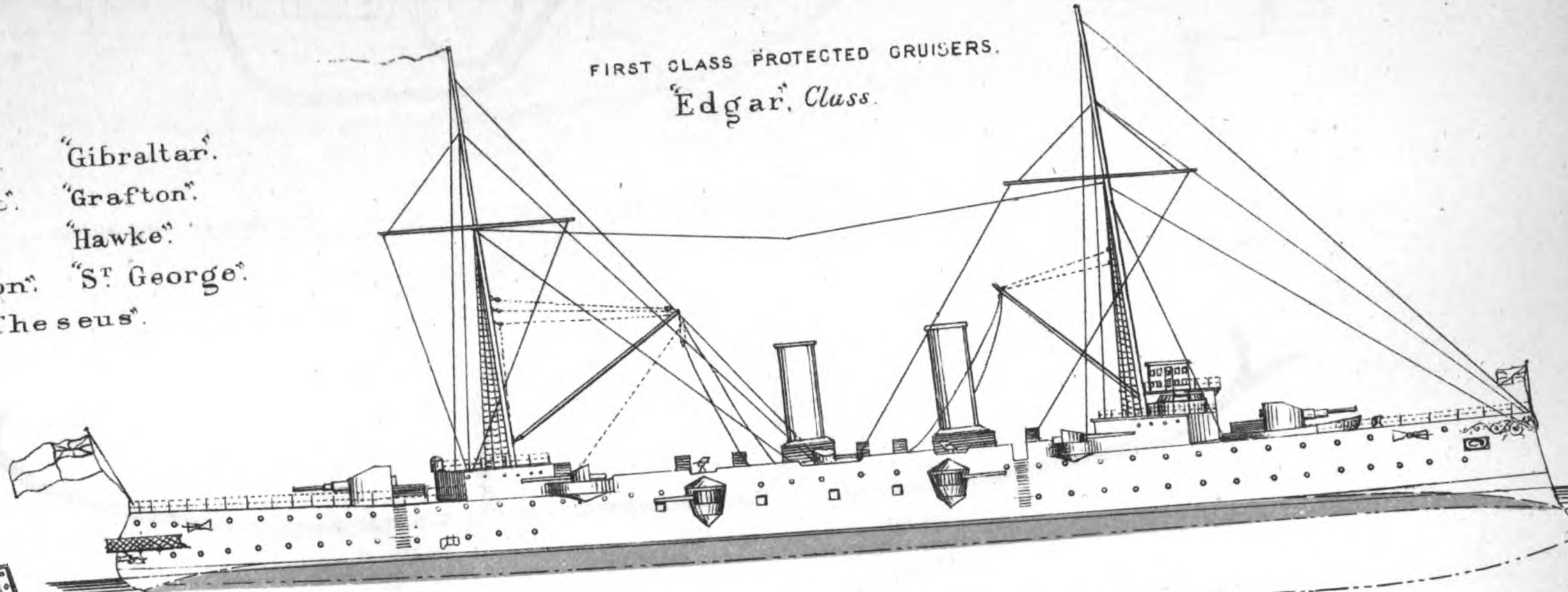
BRITISH SHIPS.
Dreadnought.
Pl. 14.
14 in
11 in
14 in
Powder
Coals
Engines
Boilers
Boilers.
Coals
Powder
Cables
144 ft 4 in
Upper Deck
320 ft
31 ft 10 in
184 ft
Dreadnought.
7 in + 7 in
Section in way of Turret
14 in
Coals
Glatton.
12 in
12 in
245 ft
Upper Deck
120 ft
8 in + 6 in
Glatton.
Section in way of Turret.
12 in
12 in

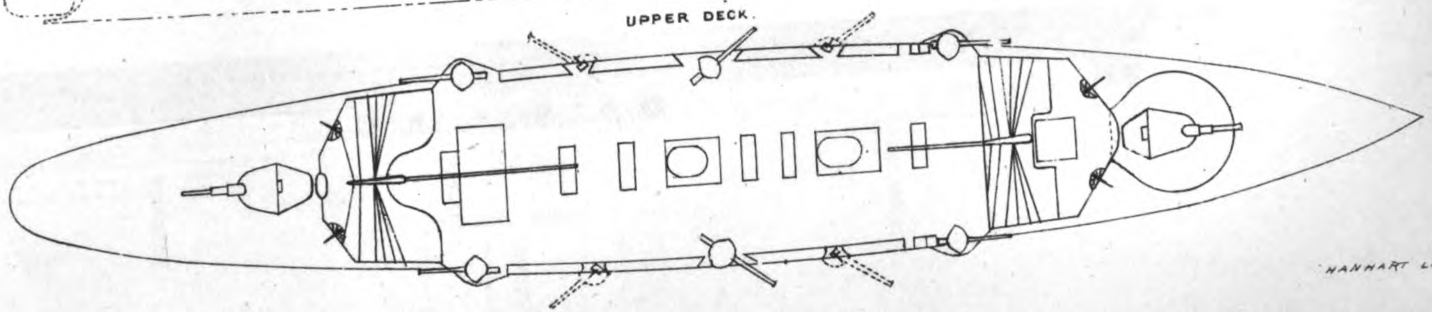
BRITISH SHIPS.

FIRST CLASS PROTECTED CRUISERS.

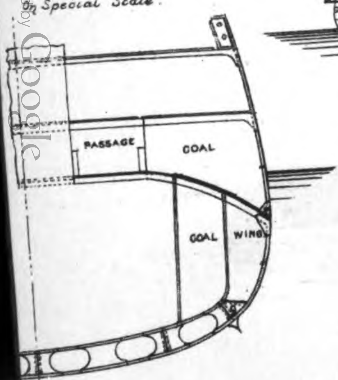
"Edgar", Class.

"Centaur". "Gibraltar".
"Crescent". "Grafton".
"Edgar". "Hawke".
"Endymion". "St George".
"Theseus".



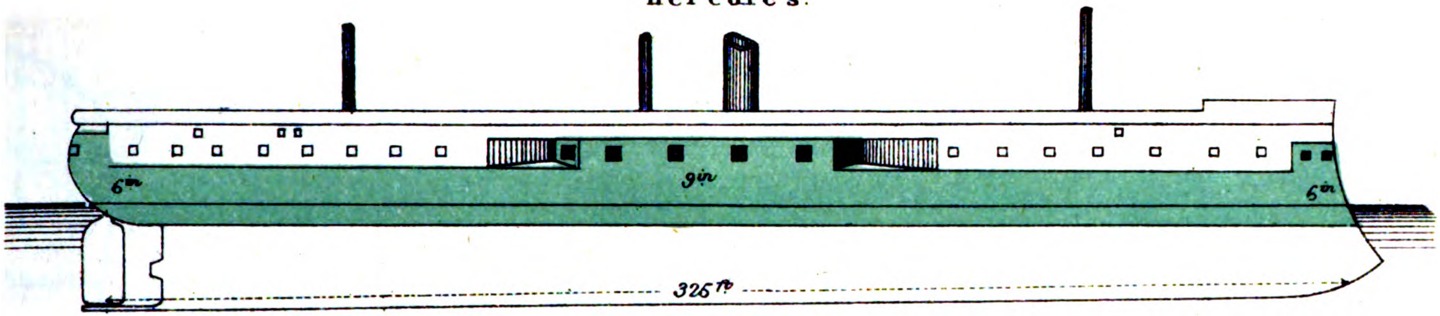


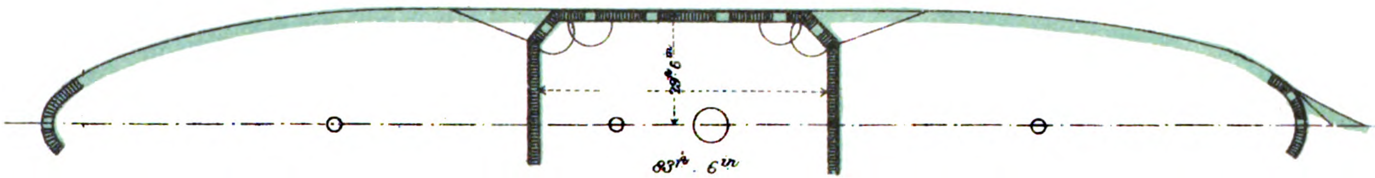
MIDSHIP SECTION.
On Special Scale.

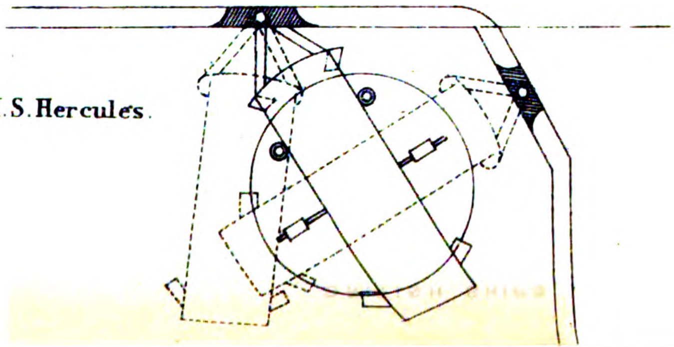


BRITISH SHIPS.

"Hercules."



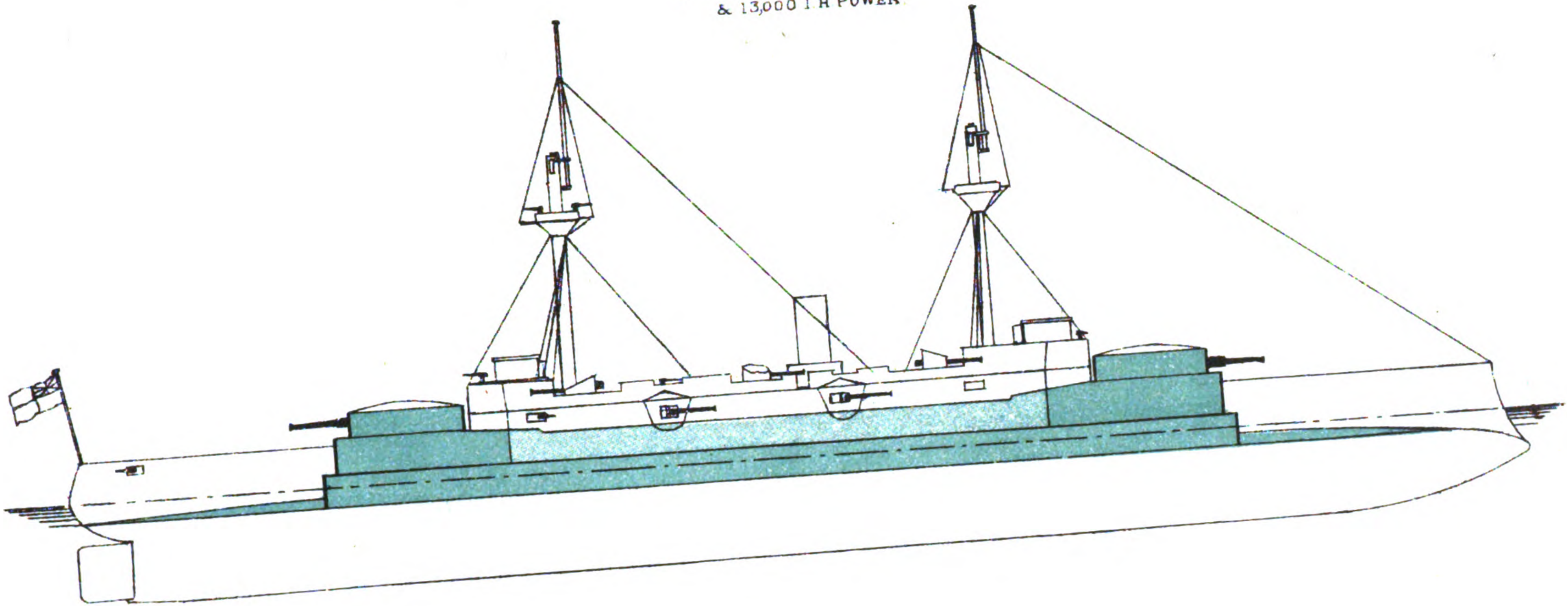




Angle Port of H.M.S. Hercules.

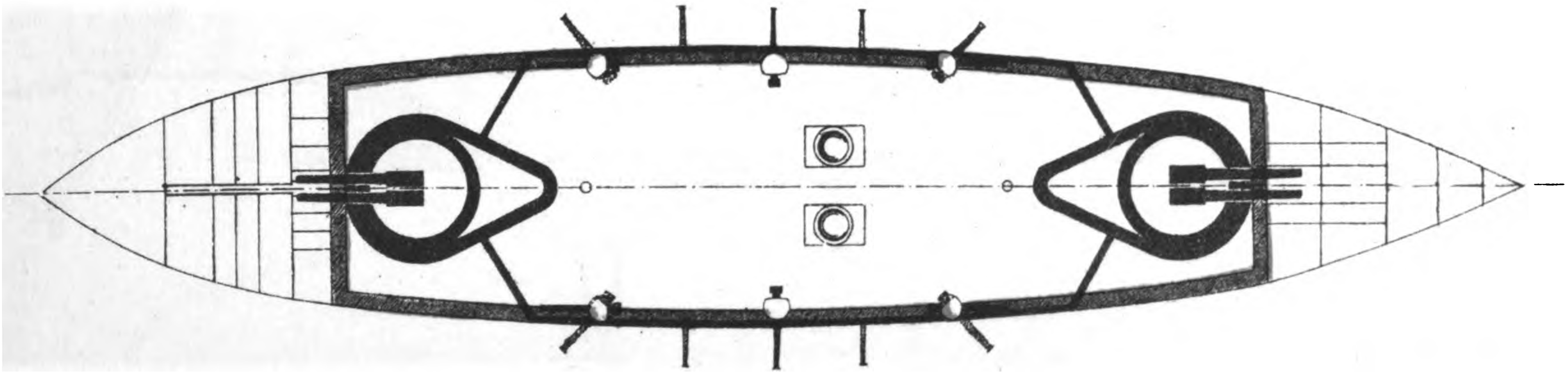
BRITISH SHIPS.

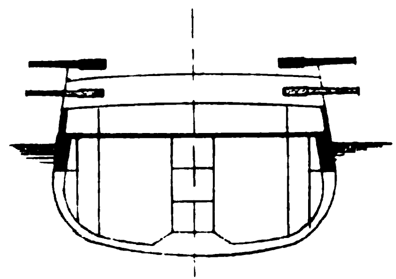
New Battle Ship, (Turret with Redoubts) "Hood".
of 14,150 TONS DISPLACEMENT.
& 13,000 I.H POWER.



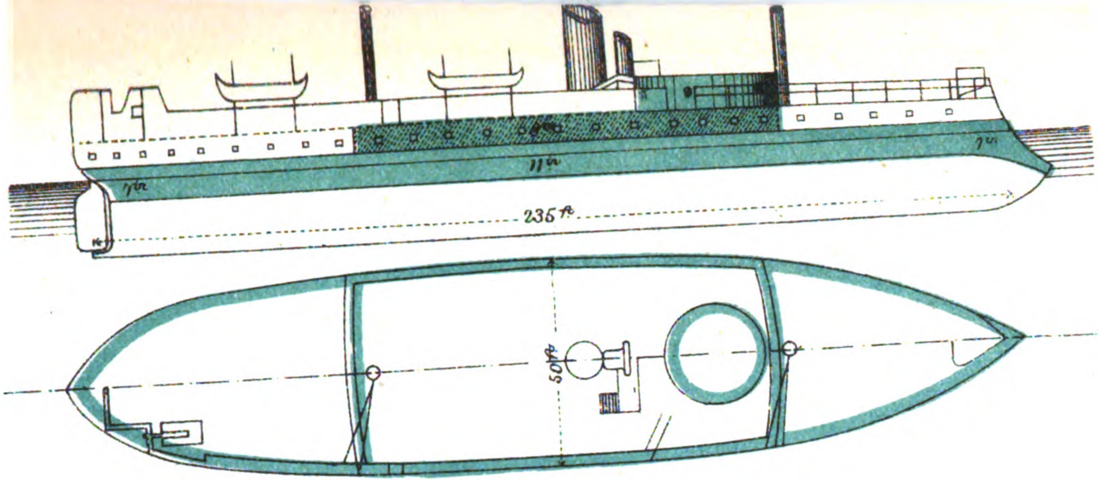
Pl. 18.

"Hood".

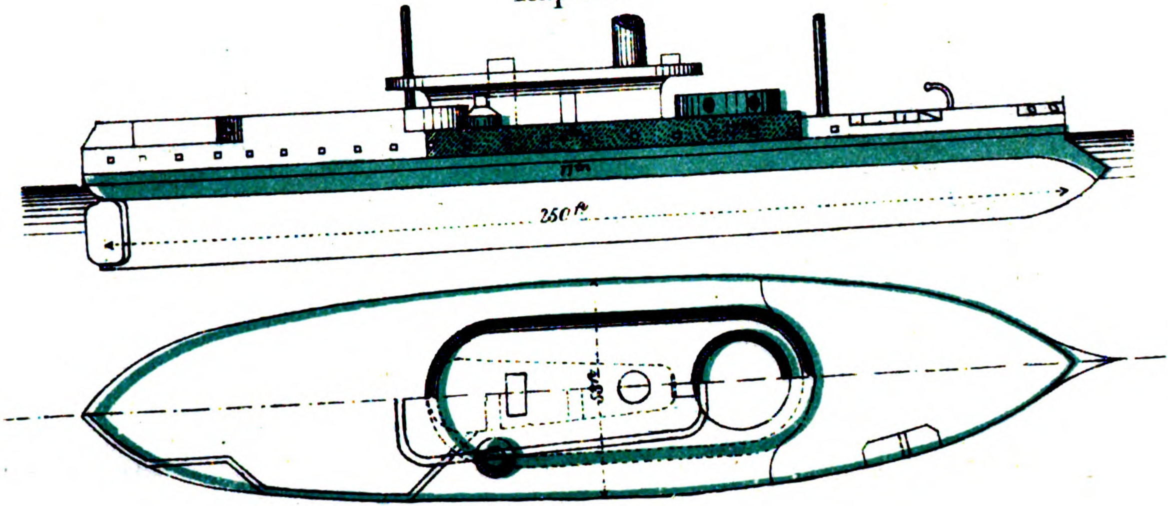




On Special Scale



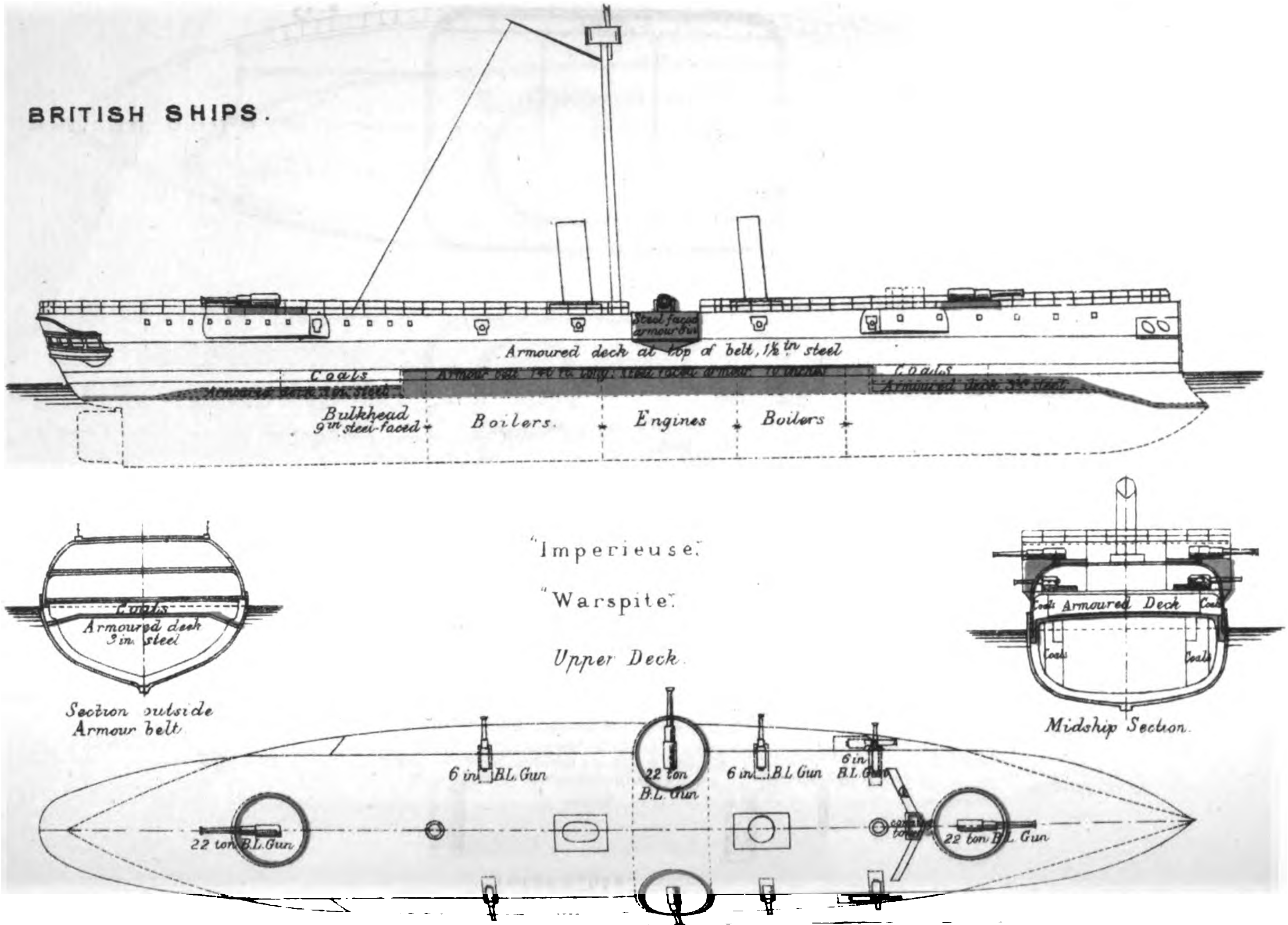
"Rupert."



Breastwork Deck

HANHART LITH.

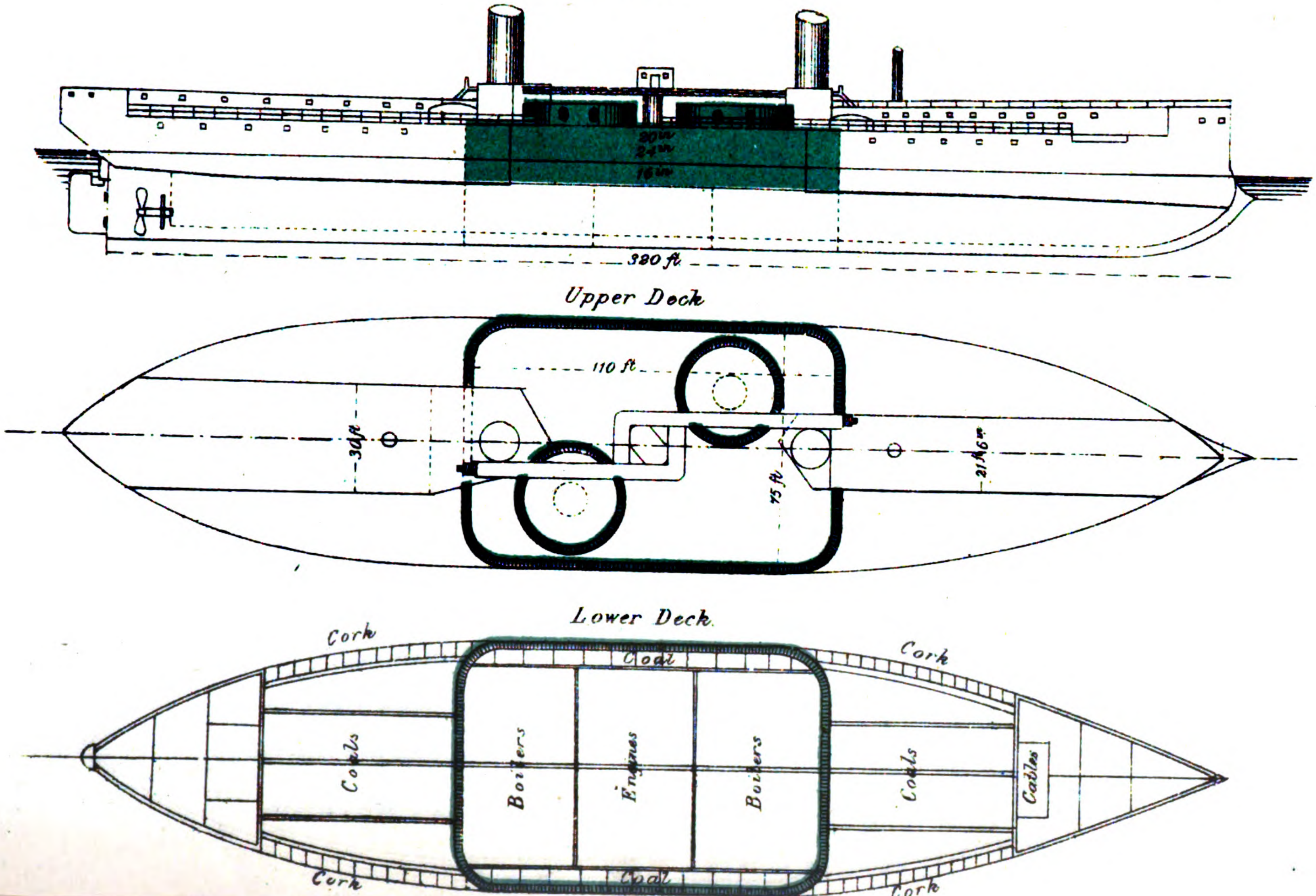
BRITISH SHIPS.



BRITISH SHIPS.

"Inflexible."

Pl. 21.



HANHART LITH.

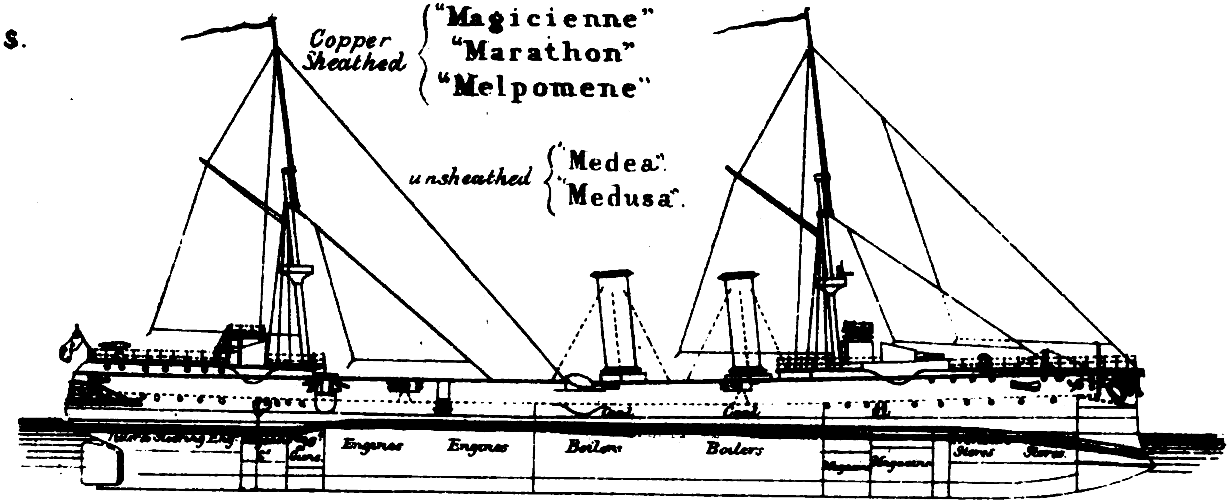
BRITISH SHIPS.

Pl 22

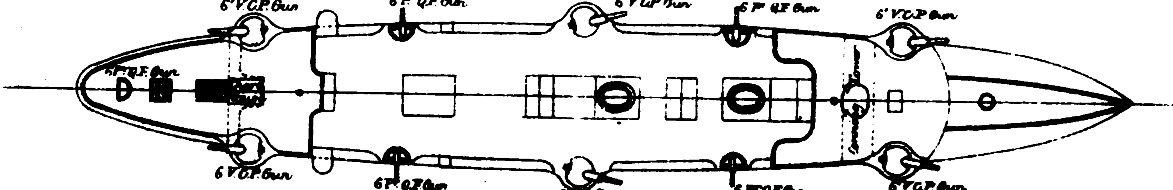
Wood Sheathed Protected Cruisers,

Copper Sheathed { "Magicienne" "Marathon" "Melpomene"

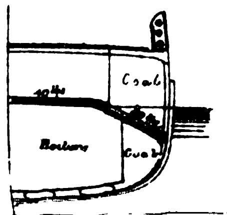
unsheathed { "Medea". "Medusa".

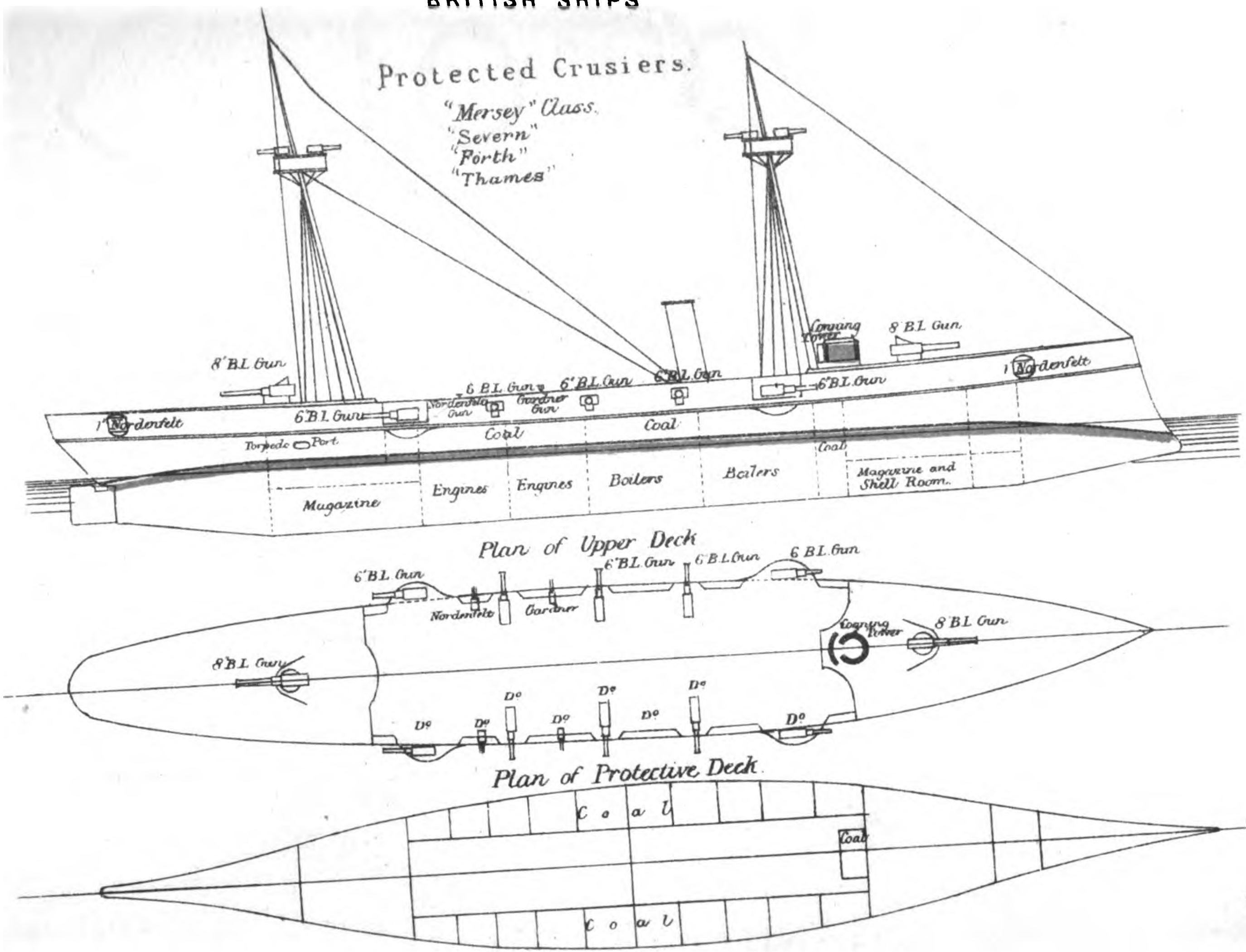


Plan of Upper Works



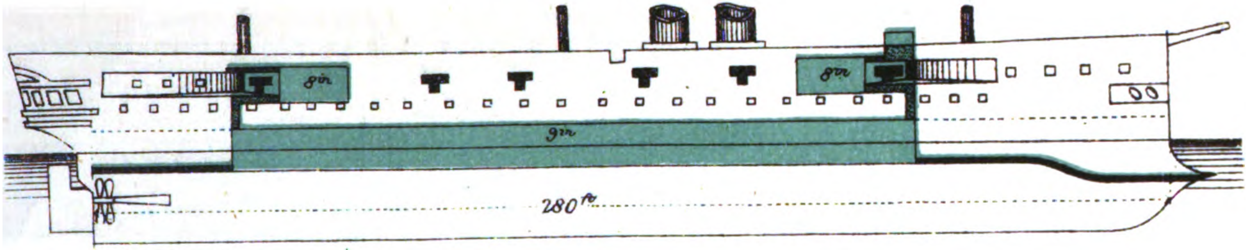
Midship Section

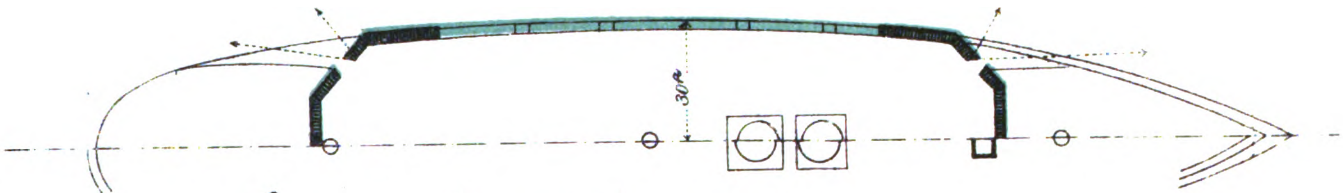



Protected Crusiers.
"Mersey" Class.
"Severn"
"Forth"
"Thames"
8" B.L. Gun
6" B.L. Gun
1" Nordenfelt
Torpedo Port
6 B.L. Gun
Nordenfelt Gun
Gardner Gun
Coal
Conning Tower
Magazine
Engines
Boilers
Magazine and Shell Room.
Plan of Upper Deck
Nordenfelt
Gardner
Do
Plan of Protective Deck
Coal
HANHART LITH.

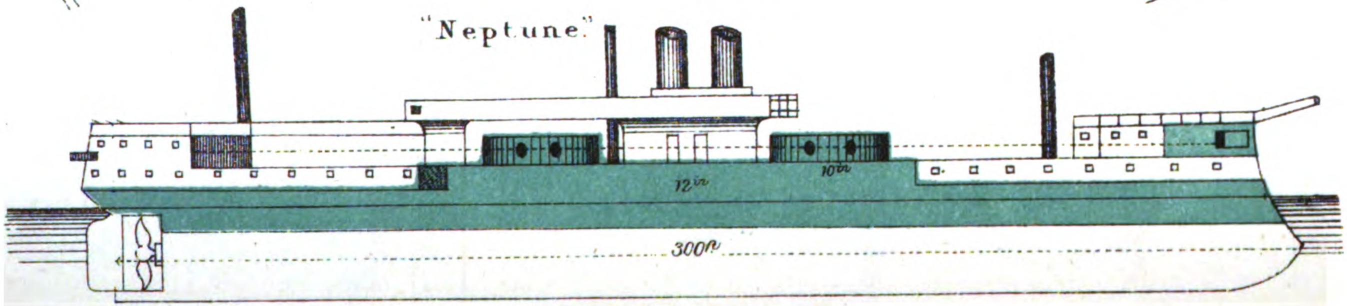
Pl. 24.

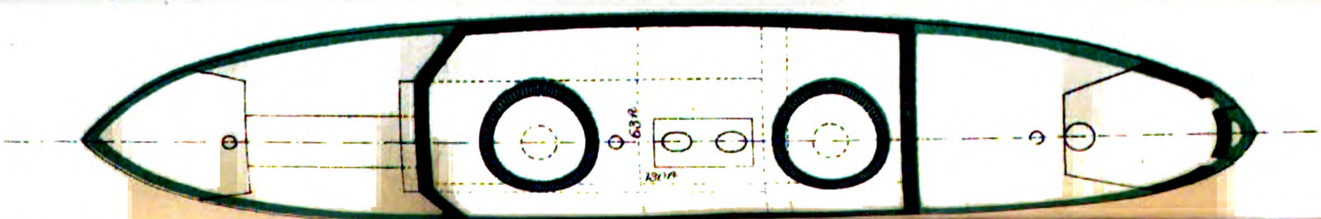
"Nelson."
"Northampton."





"Neptune."



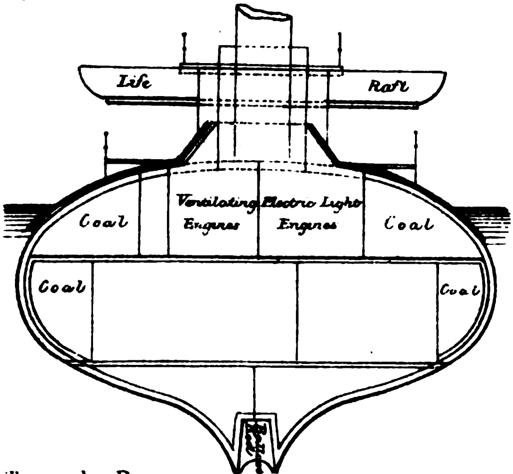


BRITISH SHIPS.

"Polyphemus".

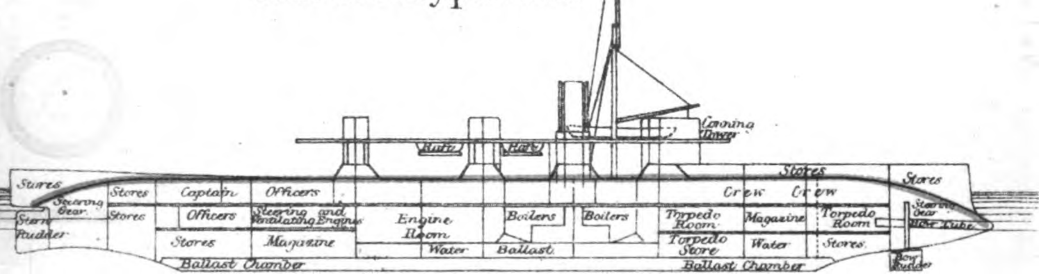
Midship Section.

On Special Scale.

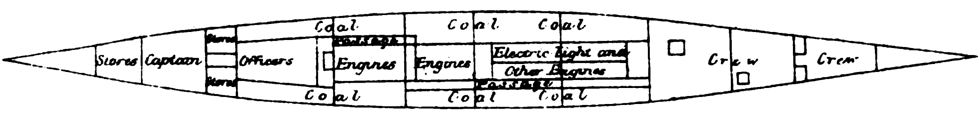


Protected Torpedo Ram

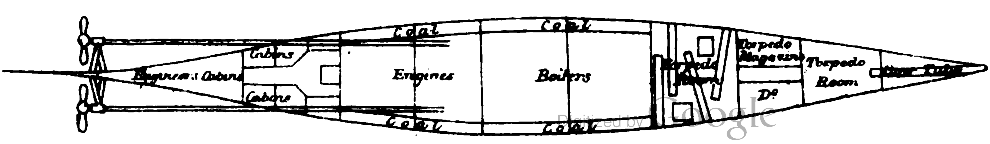
H. M. S. "Polyphemus".



Main Deck



Lower Deck

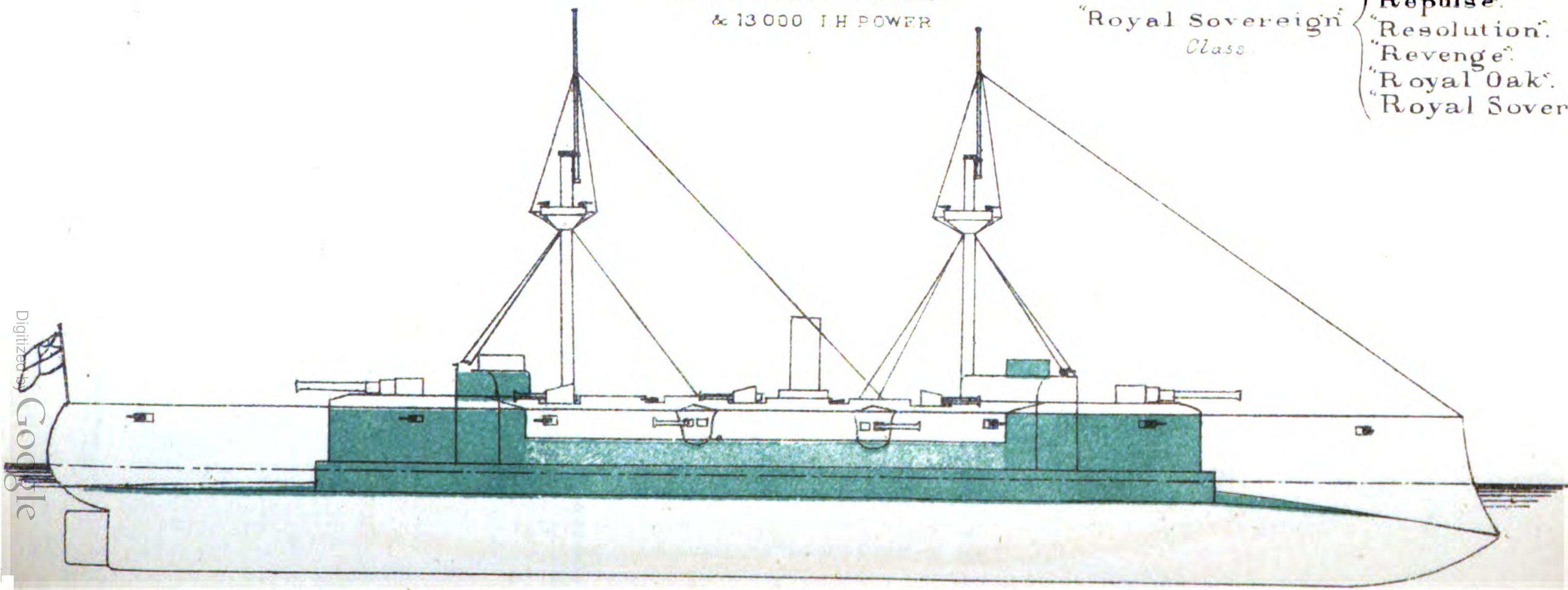


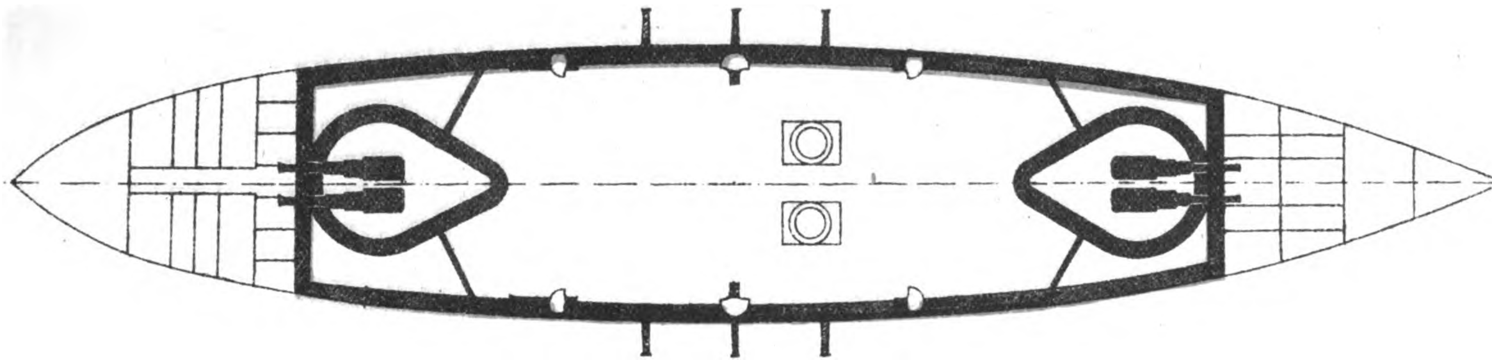
BRITISH SHIPS.

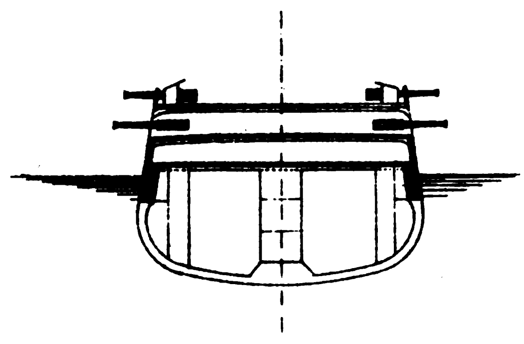
of 14150 TONS DISPLACEMENT & 13000 I.H. POWER

"Royal Sovereign" Class

- "Ramillies".
- "Renown".
- "Repulse".
- "Resolution".
- "Revenge".
- "Royal Oak".
- "Royal Sovereign".





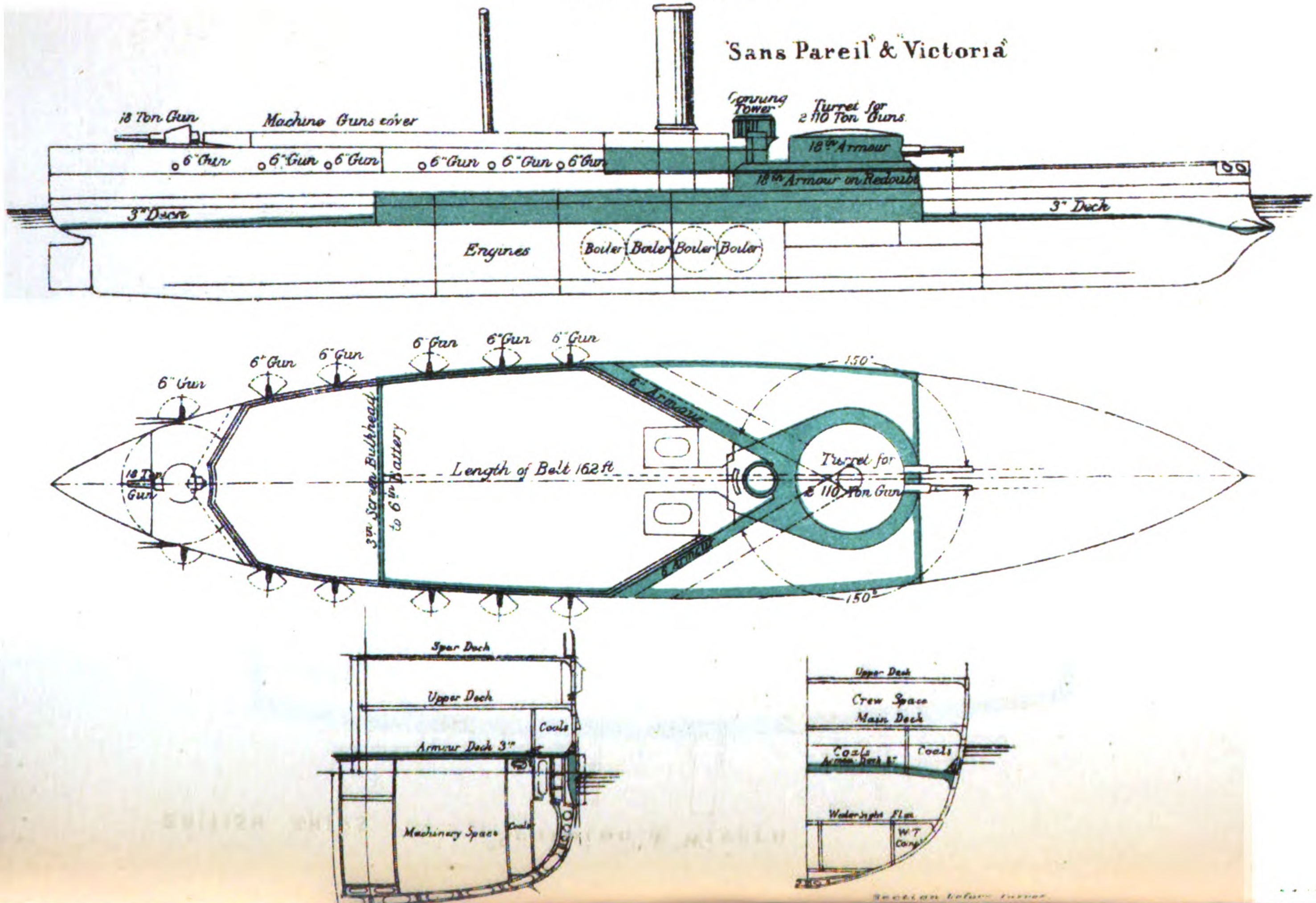


(On Special Scale)

"Royal Sovereign". Class.

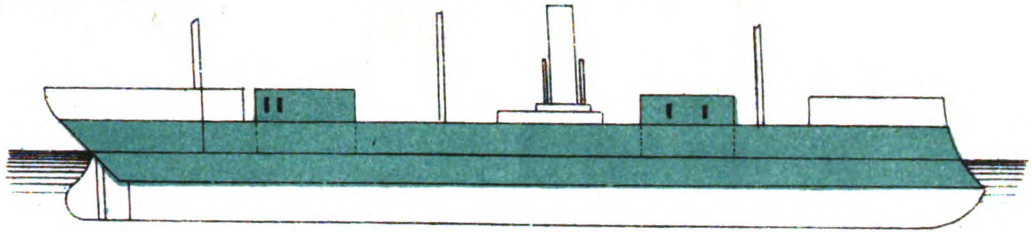
Pl. 28

'Sans Pareil' & 'Victoria'

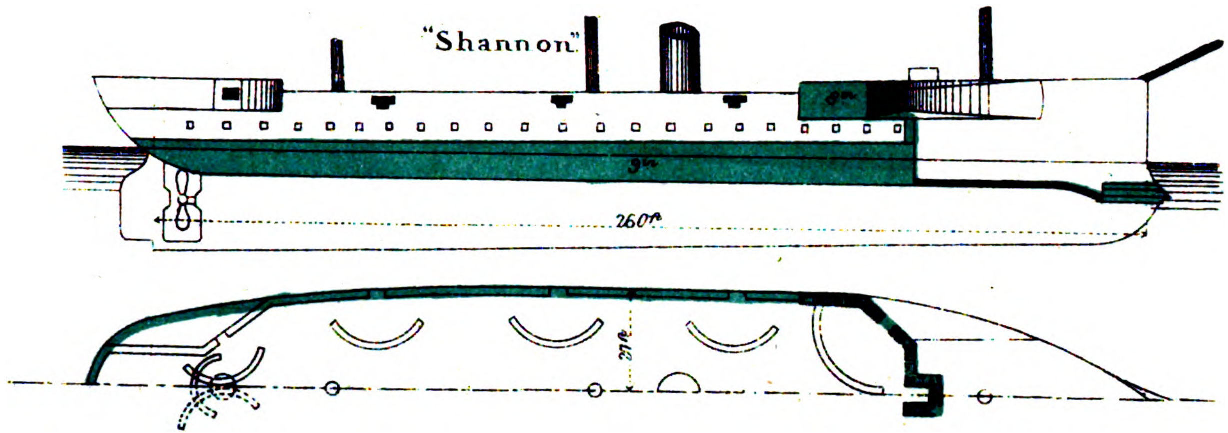


BRITISH SHIPS

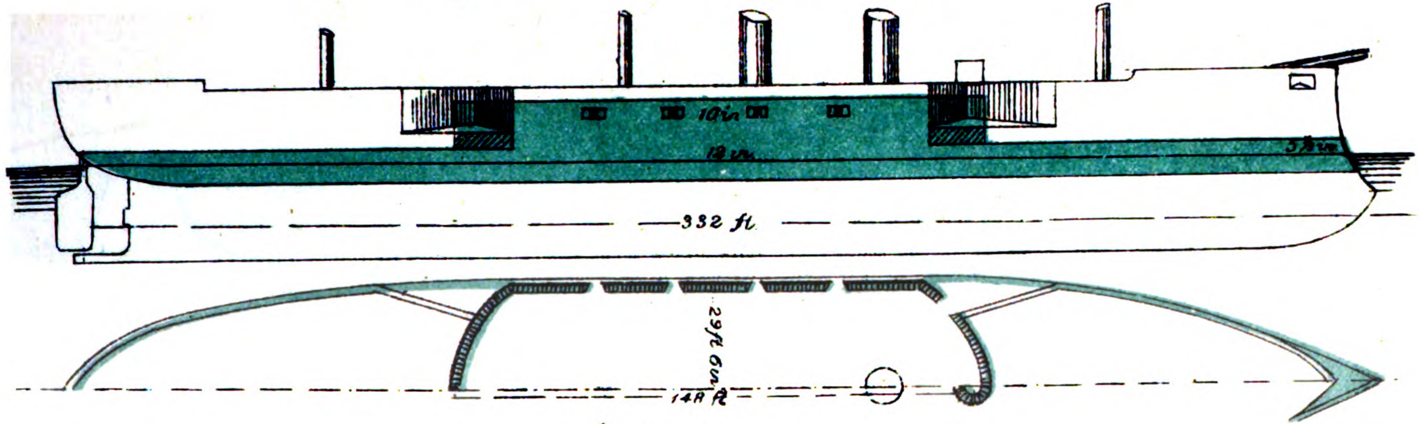
"Scorpion" & "Wivern."



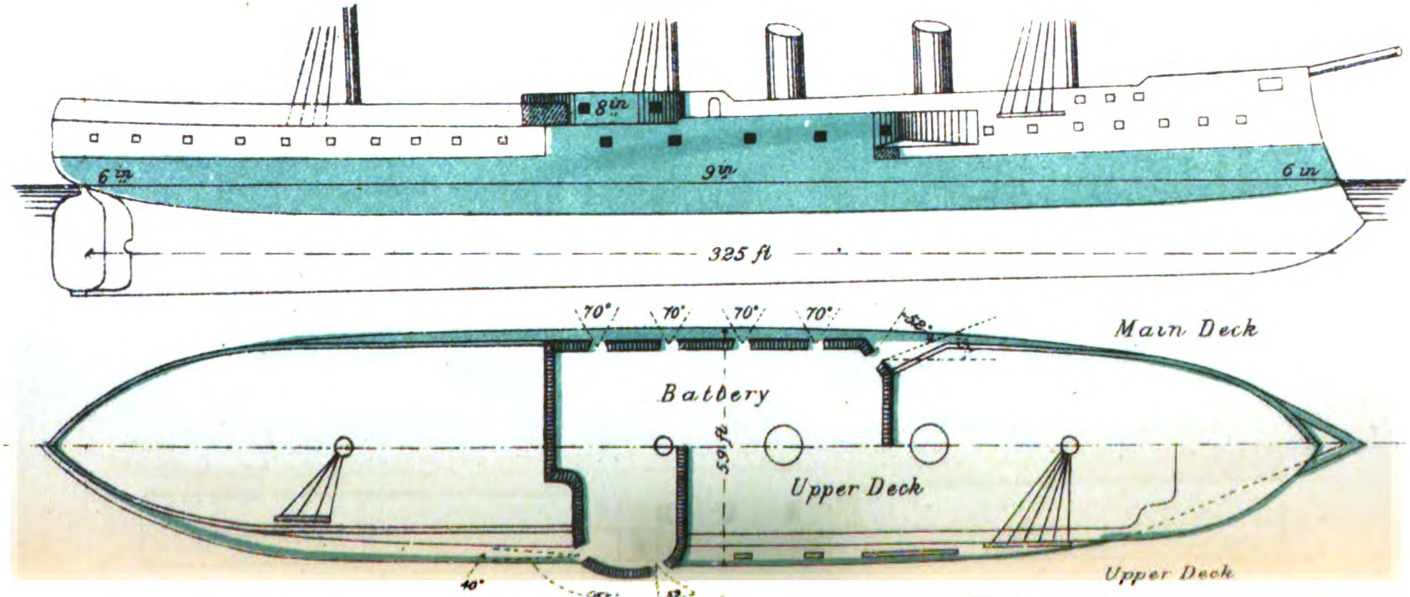
"Shannon."

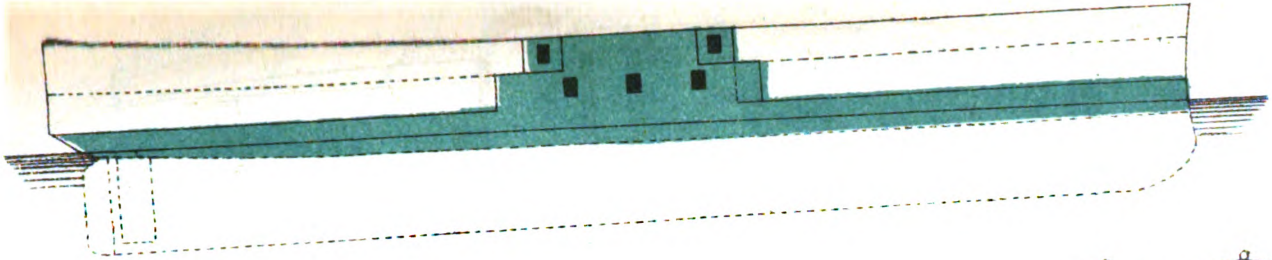


"Superb" & Turkish Ship "Mesoodieh".



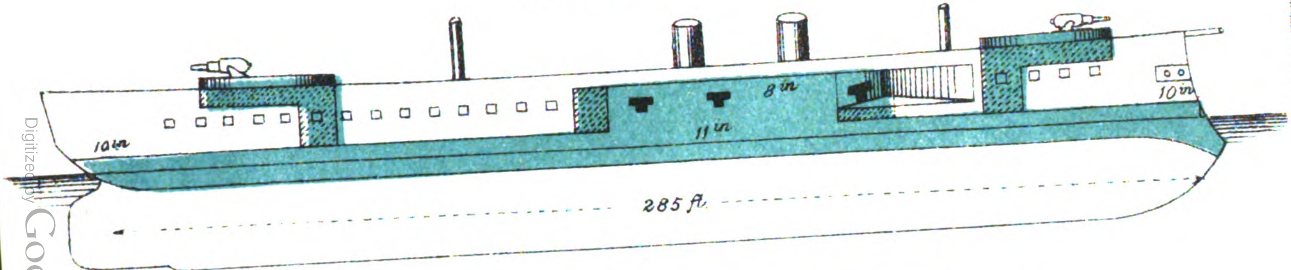
"Sultan".

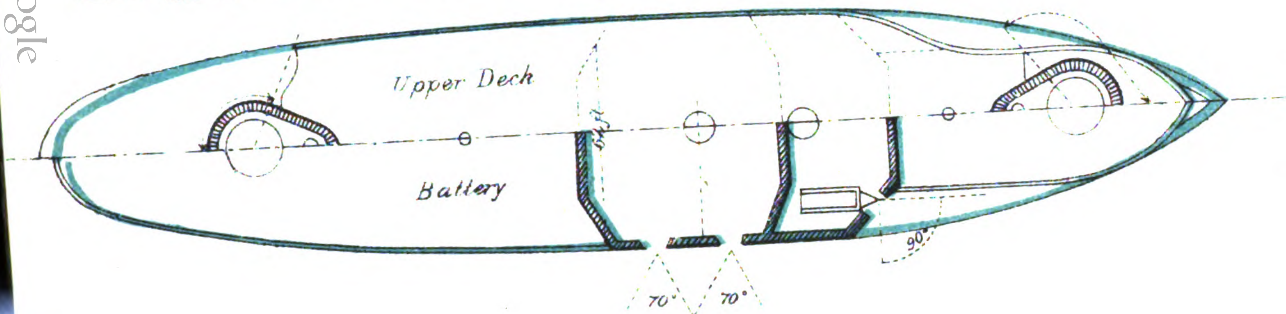


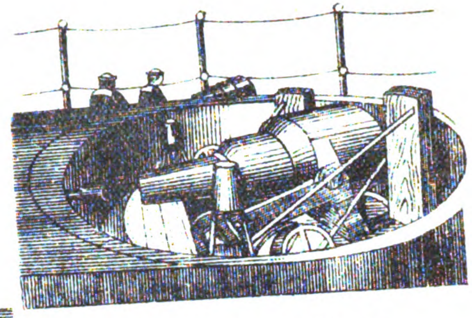


BRITISH SHIPS

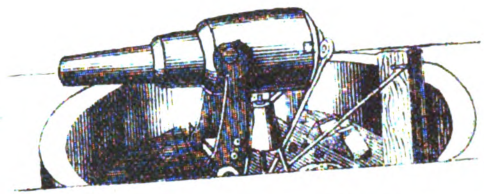
"Téméraire"







Téméraire's Gun, loading position.

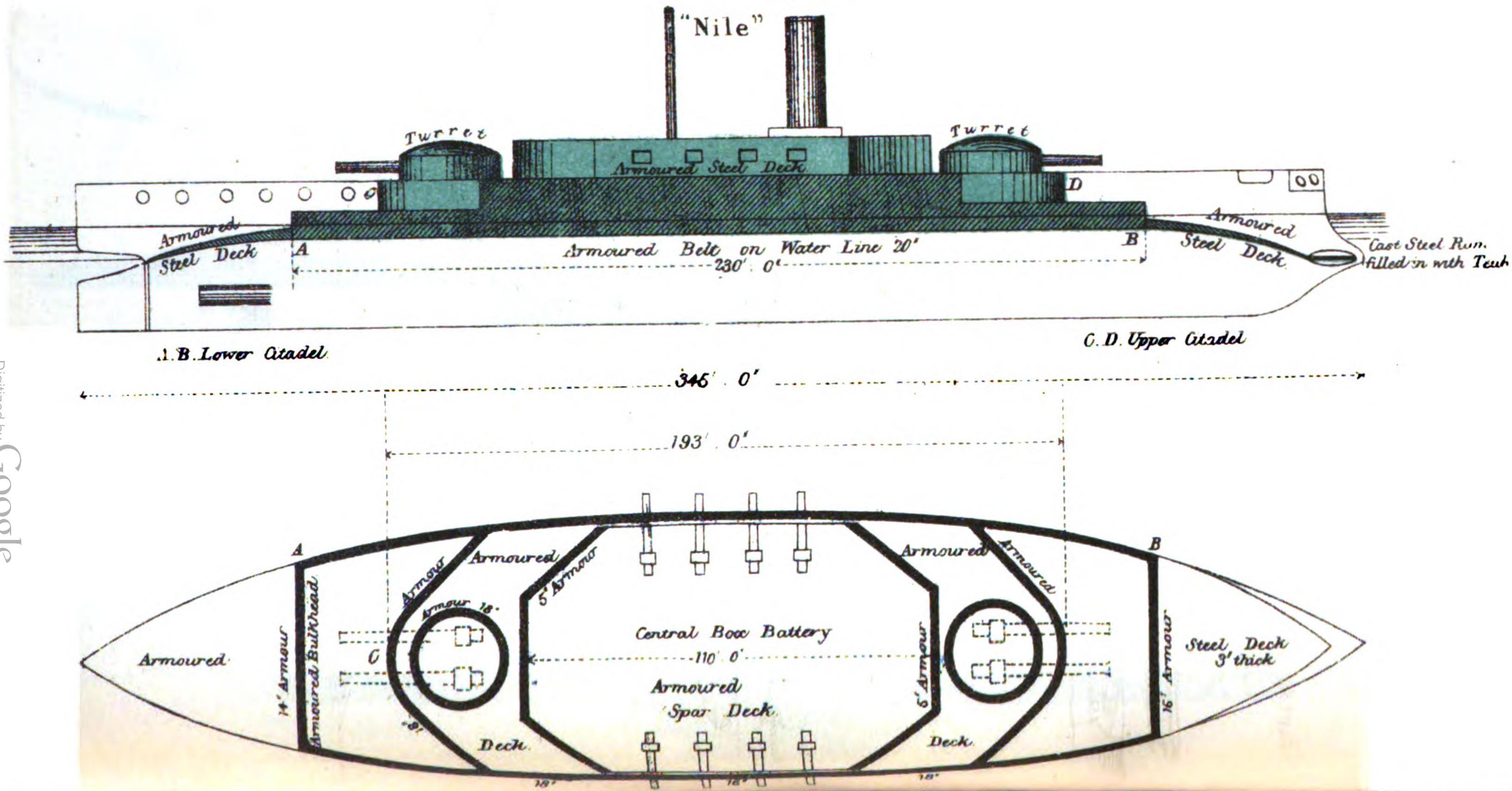


Temeraire's Gun, firing position

HANHART LITH

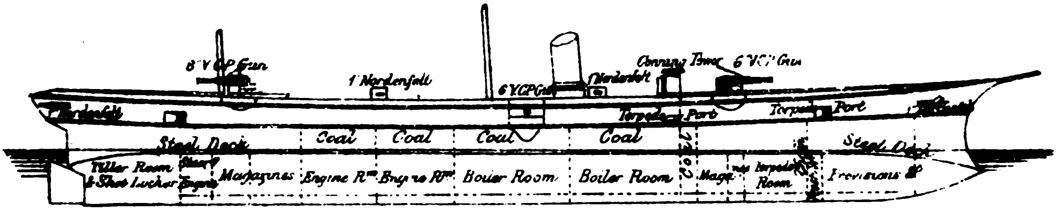
BRITISH SHIPS.

"Trafalgar"
"Nile"

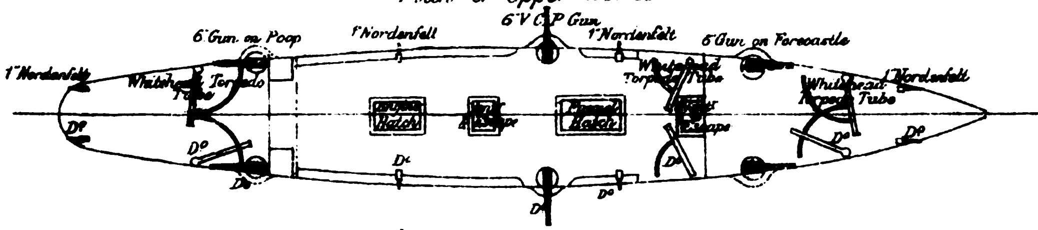


BRITISH SHIPS

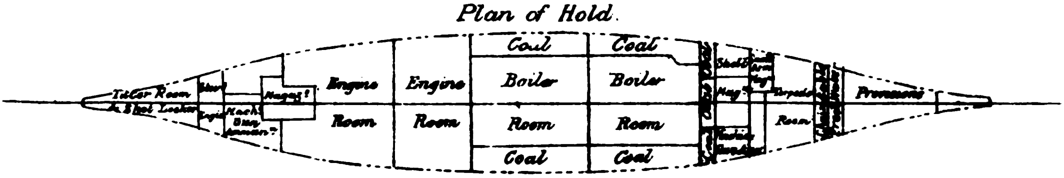
"Tartar" or "Archer" class Vessels of { "Archer", "Brisk", "Cossack", "Mohawk", "Porpoise", "Racoon", "Serpent", "Tartar".



Plan of Upper Works



Plan of Hold.



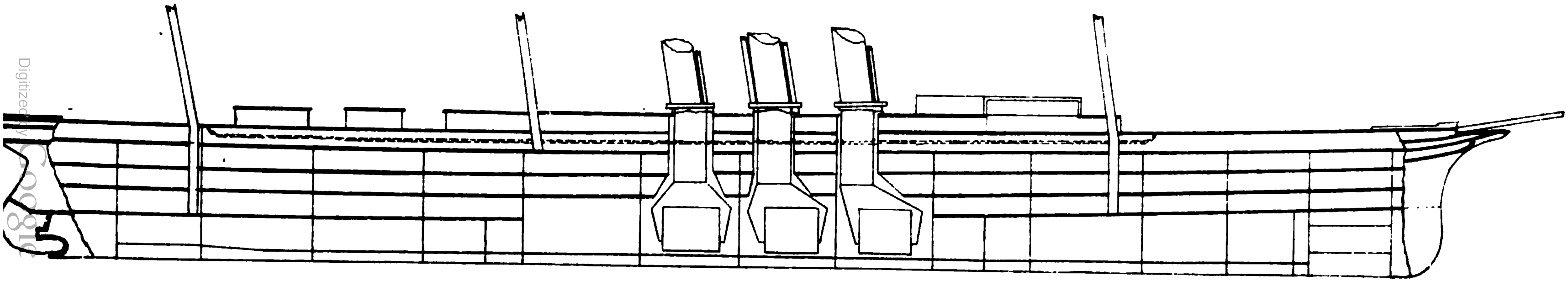
HANHART LITH.

Pl. 34.

BRITISH MERCHANT SHIPS.

"City of New York".
"City of Paris".

(On Special Scale)

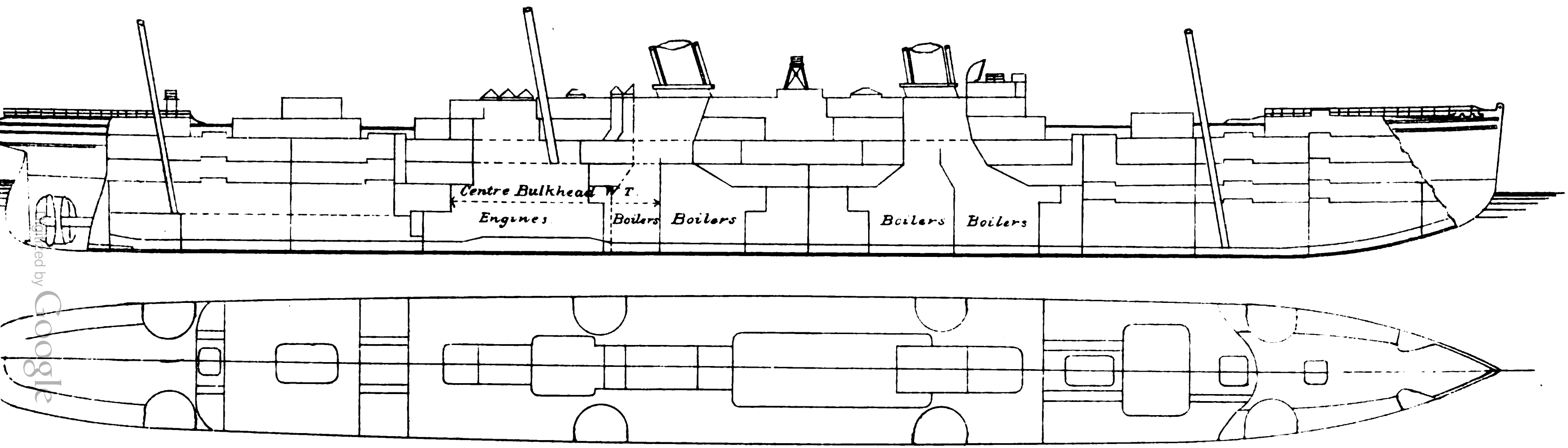


Pl. 35.

BRITISH MERCHANT SHIPS.

"Majestic"
"Teutonic"

(On Special Scale)

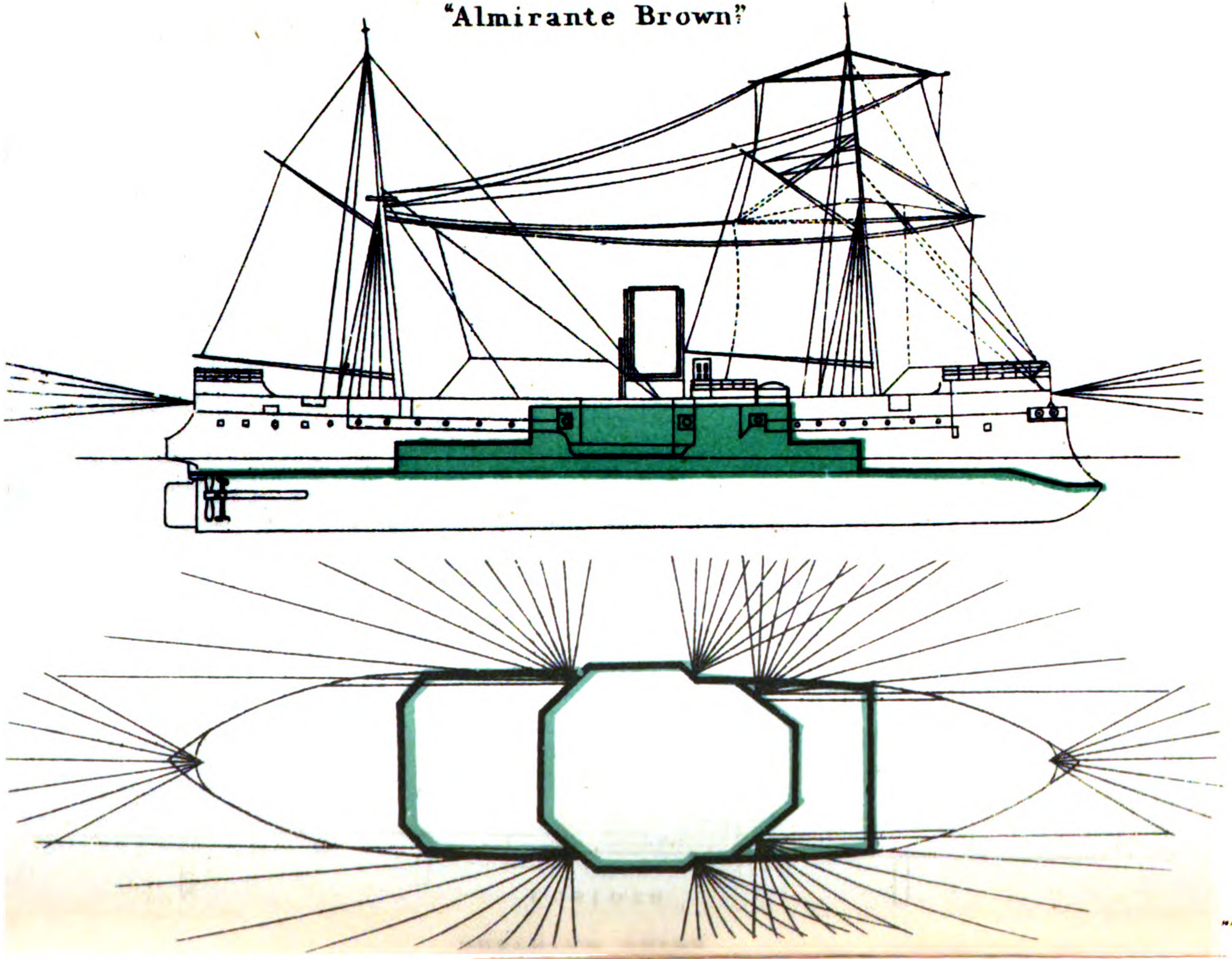


HANHART LITH.

ARGENTINE REPUBLIC SHIPS.

Pl. 36.

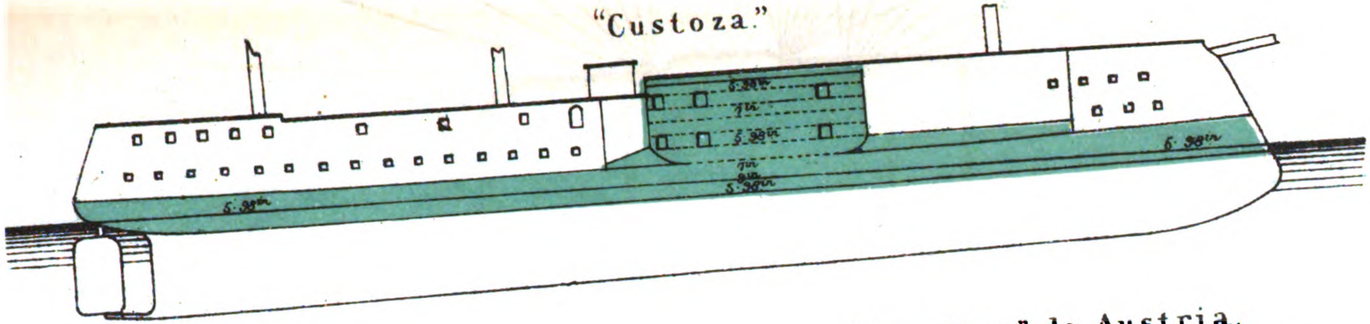
"Almirante Brown."



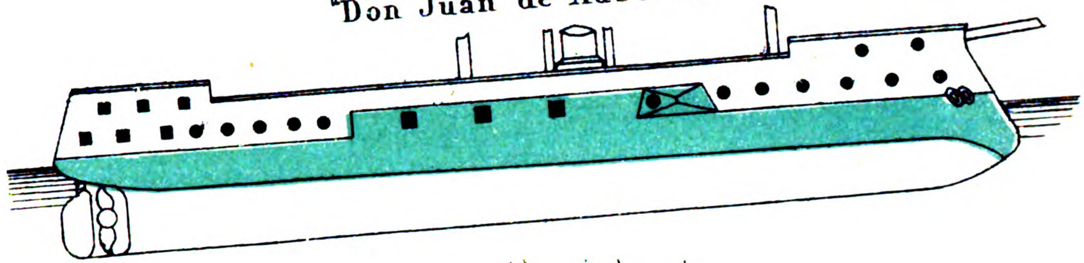
HANHART LITH.

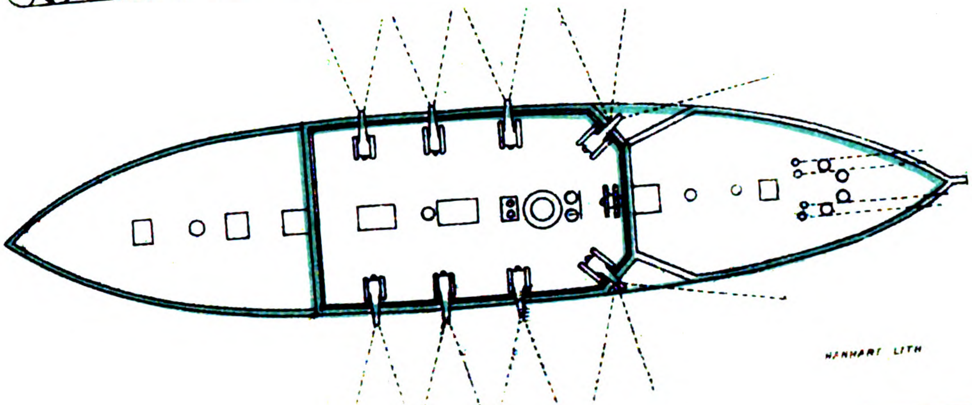
AUSTRIAN SHIPS.

"Custoza."



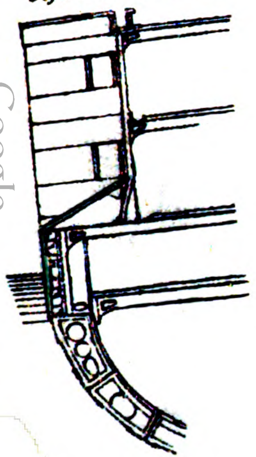
"Don Juan" de Austria.



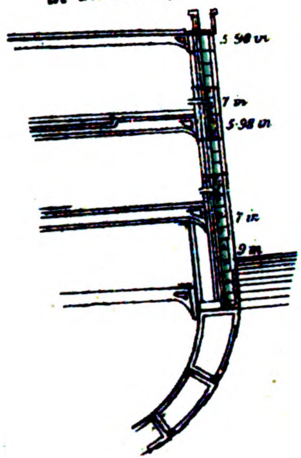


"Custoza."

before the Battery



in the Battery.

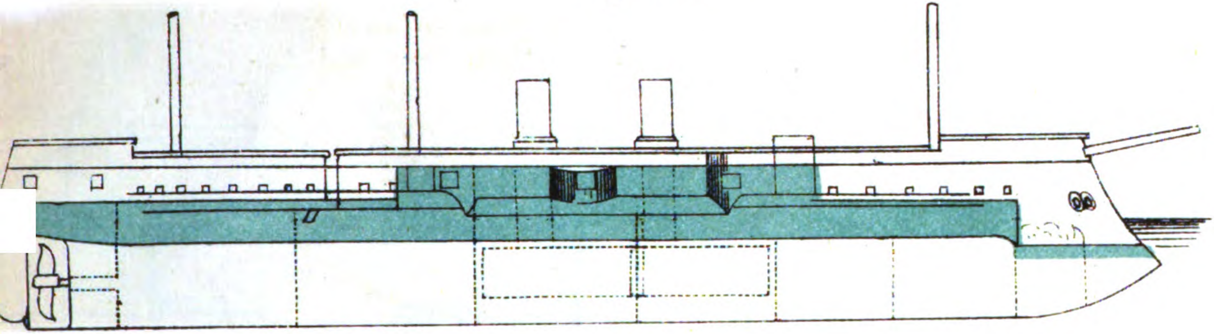


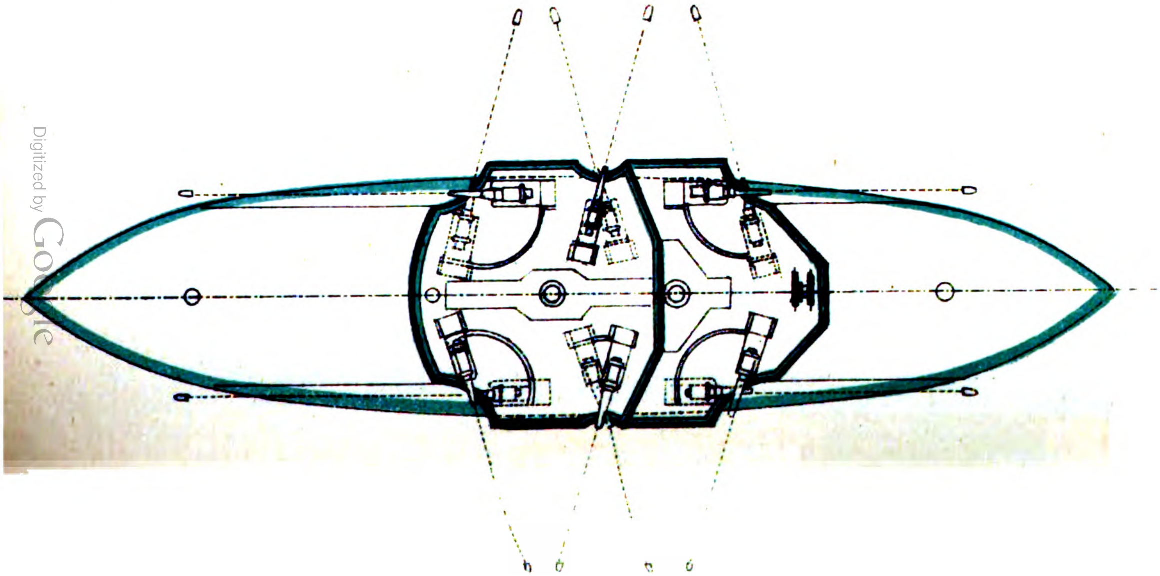
HANHART LITH

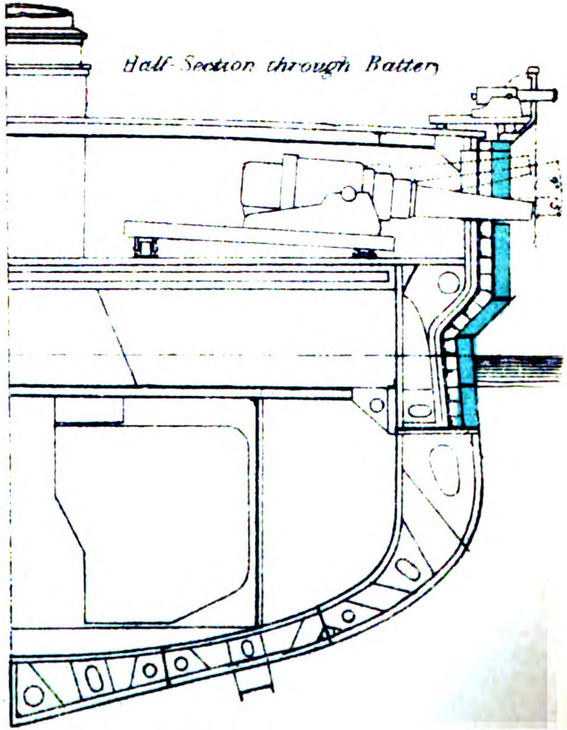
AUSTRIAN SHIPS.

"Tegetthoff"

Pl. 38.

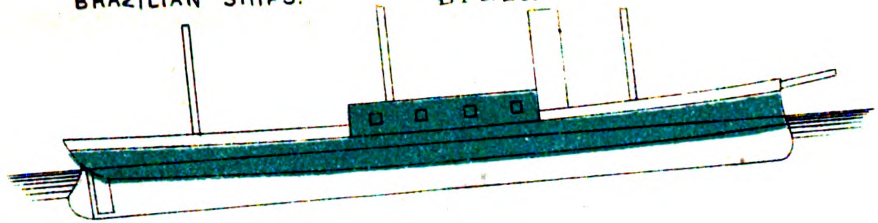




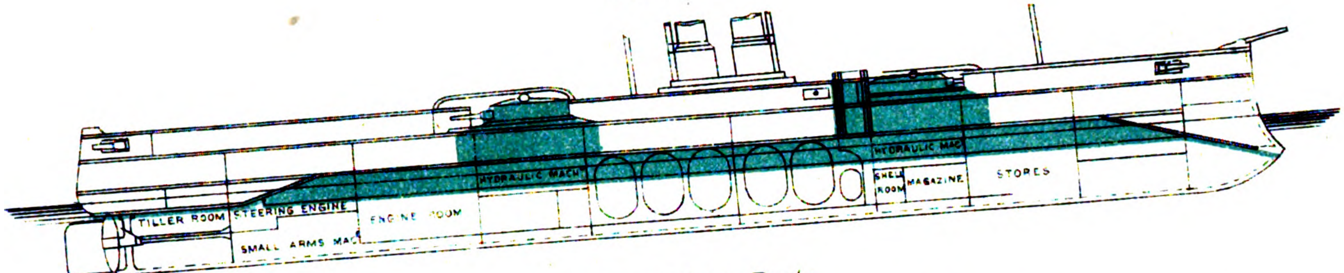


BRAZILIAN SHIPS.

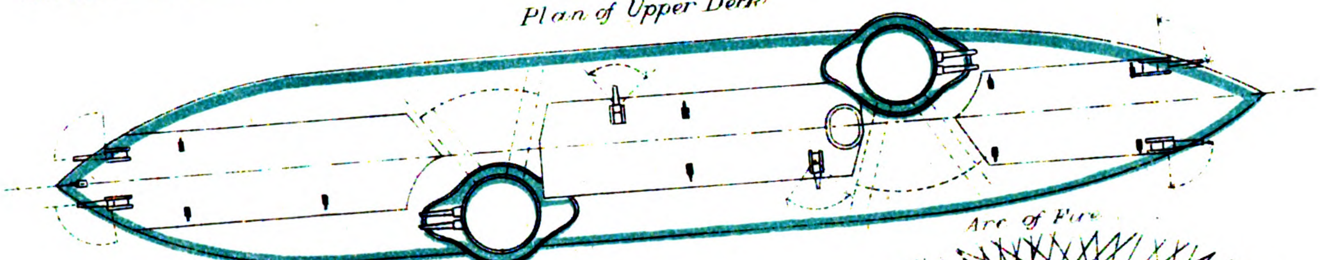
"Brazil."



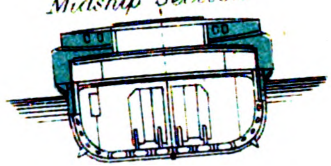
"Riachuelo."



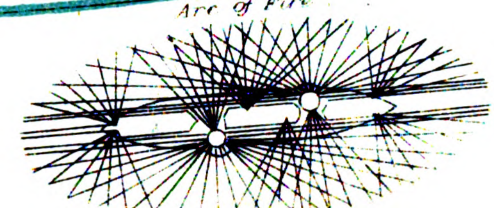
Plan of Upper Deck.



Midship Section.

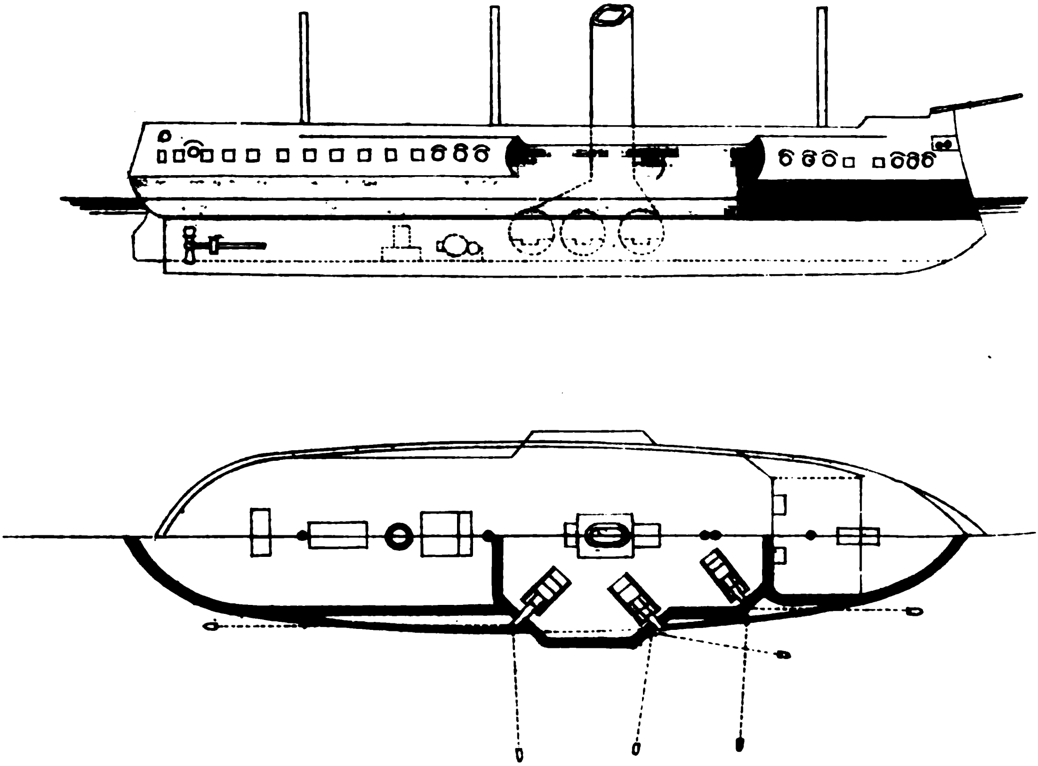


Arc of Fire.

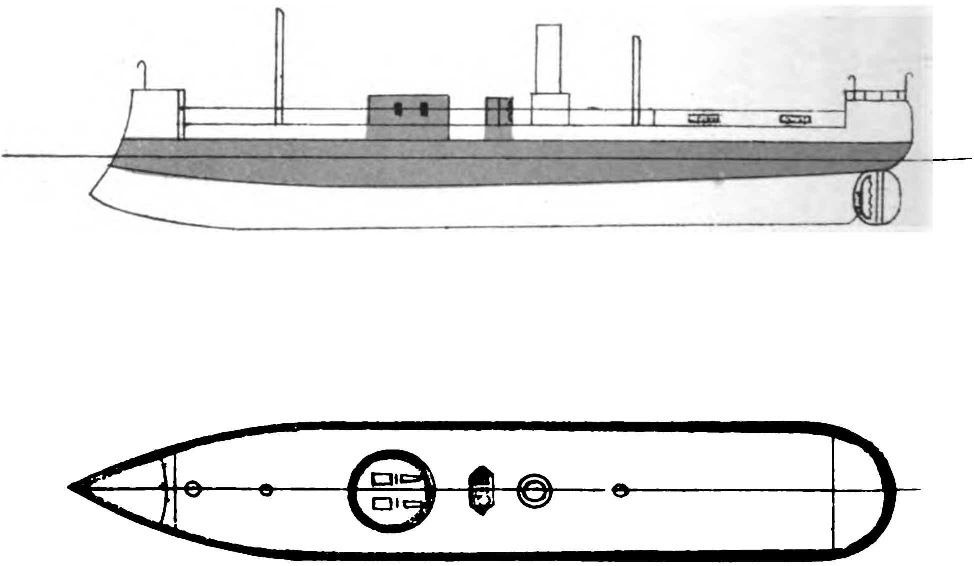


CHILIAN SHIPS.

"Almirante Cochrane"
"Blanco Encalada"



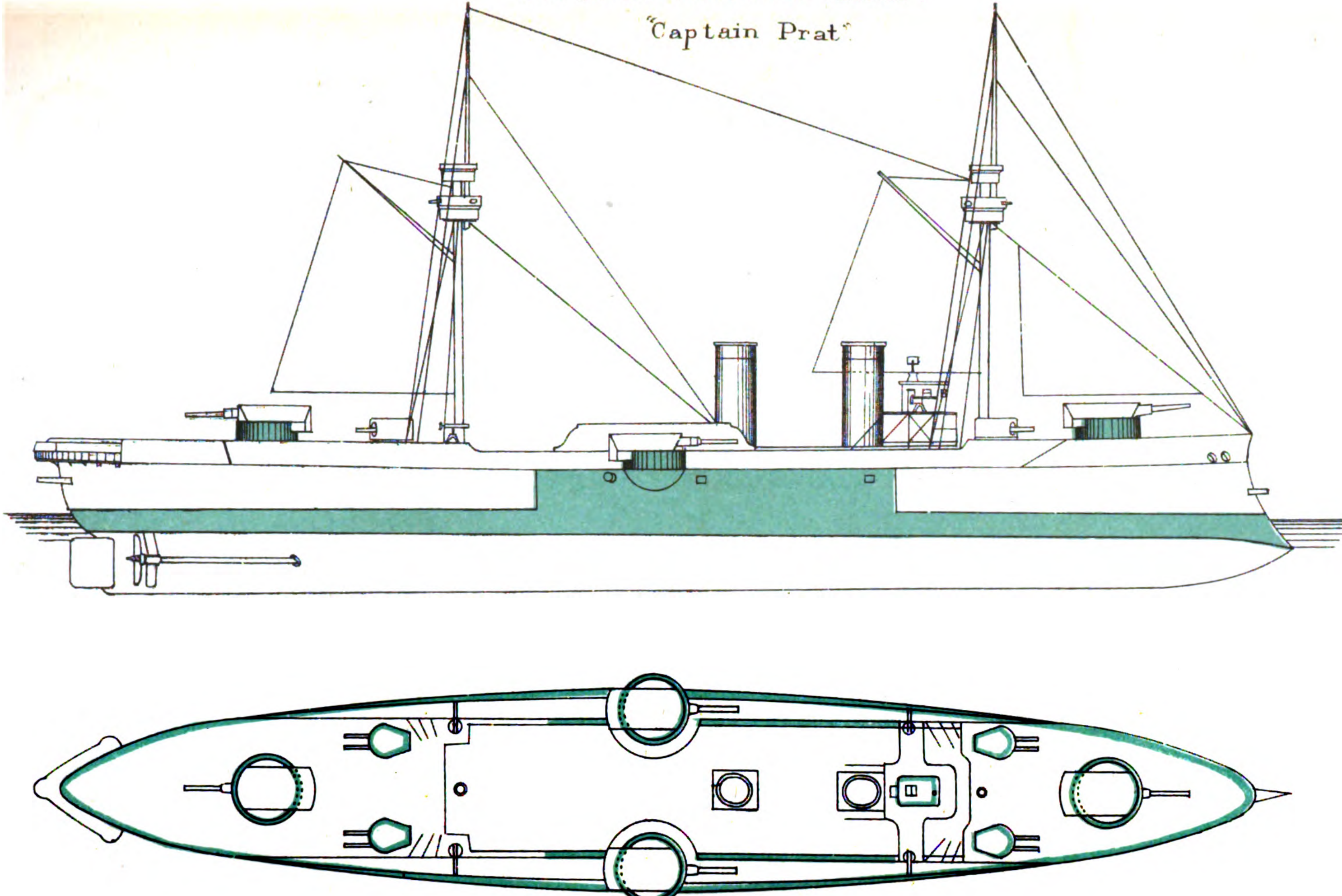
"Huascar".



Pl. 41.

NEW CHILIAN ARMOURED VESSEL.

"Captain Prat."

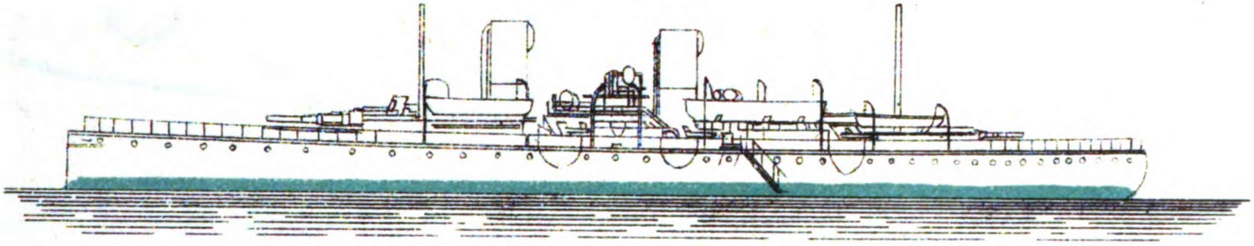


HANHART LITH.

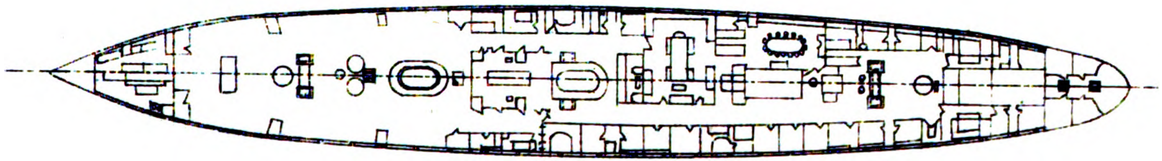
Pl. 42

CHILIAN SHIPS

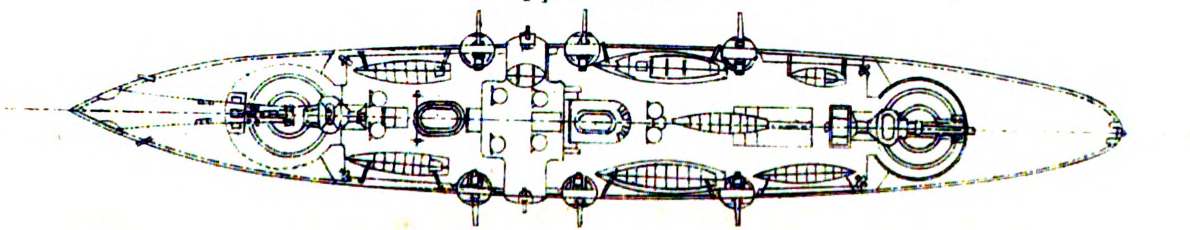
"Esmeralda"



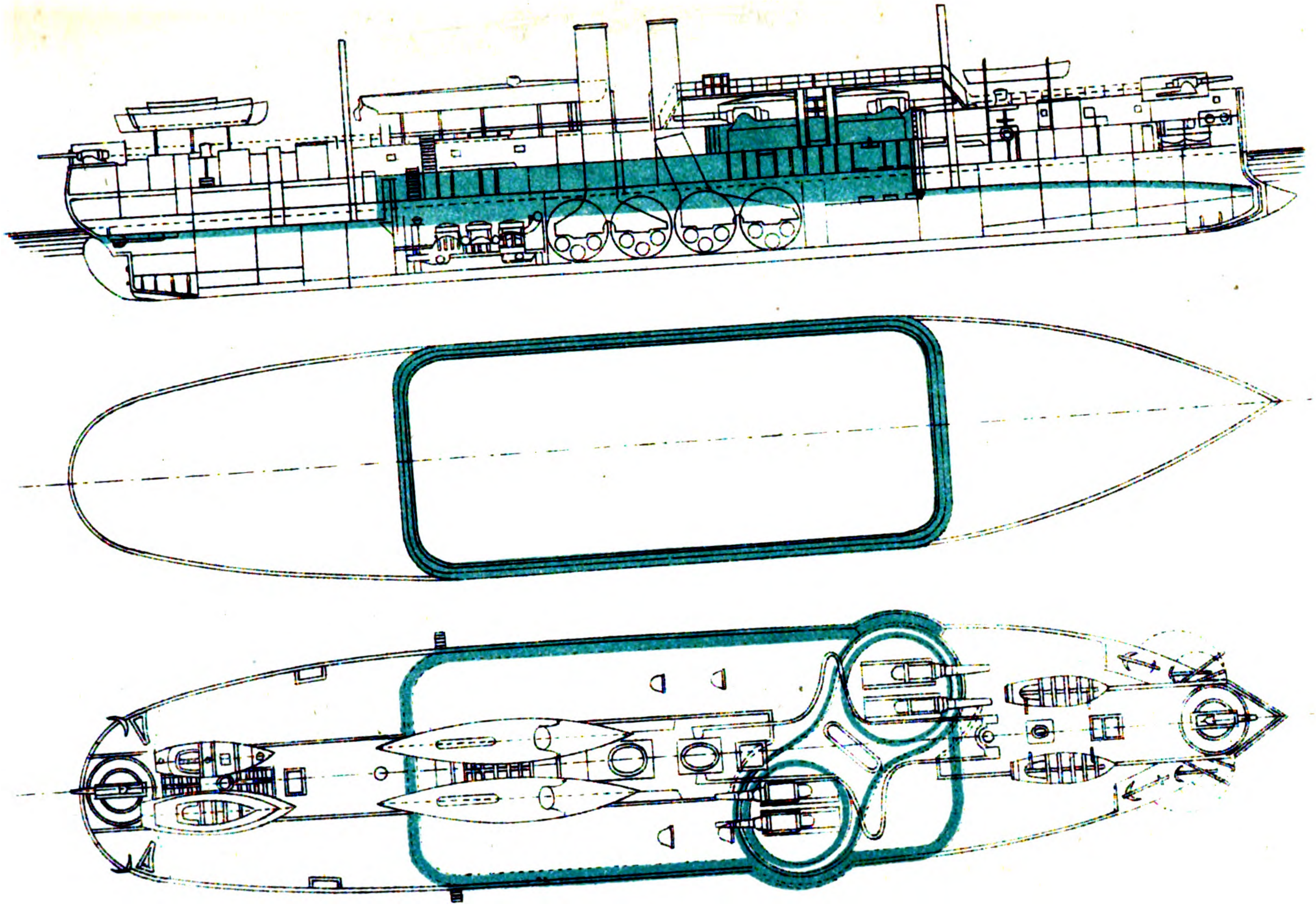
Main Deck



Upper Deck



"Ting Yuen" & "Chen Yuen".

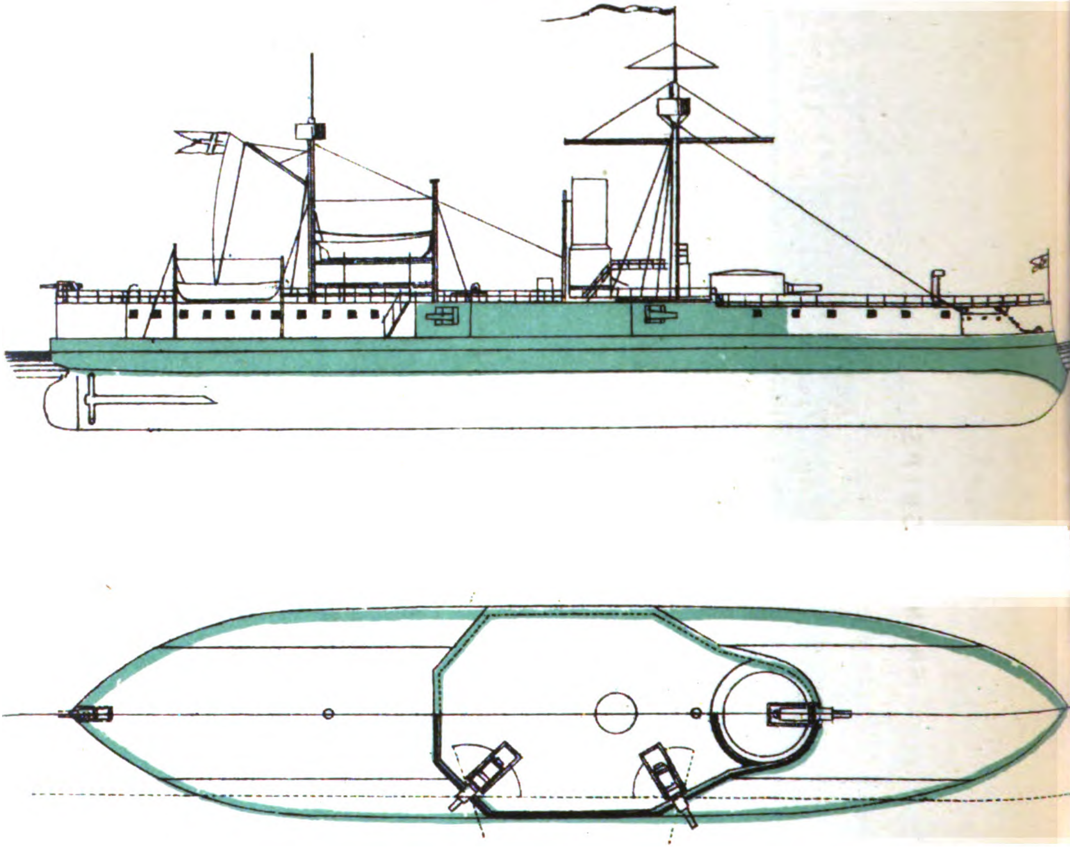


HANHART LITH.

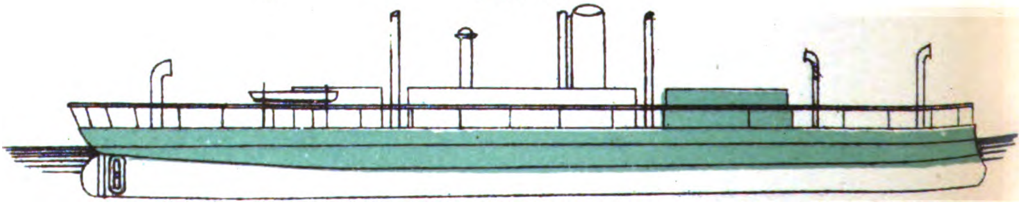
Pl. 44.

DANISH SHIPS

"Helgoland"



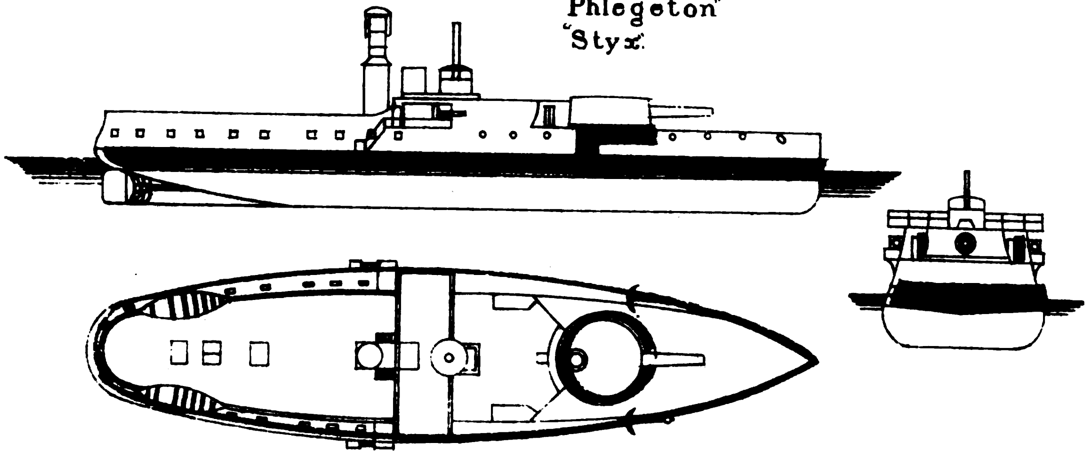
"Gorm"



HANHART LITH

FRENCH SHIPS

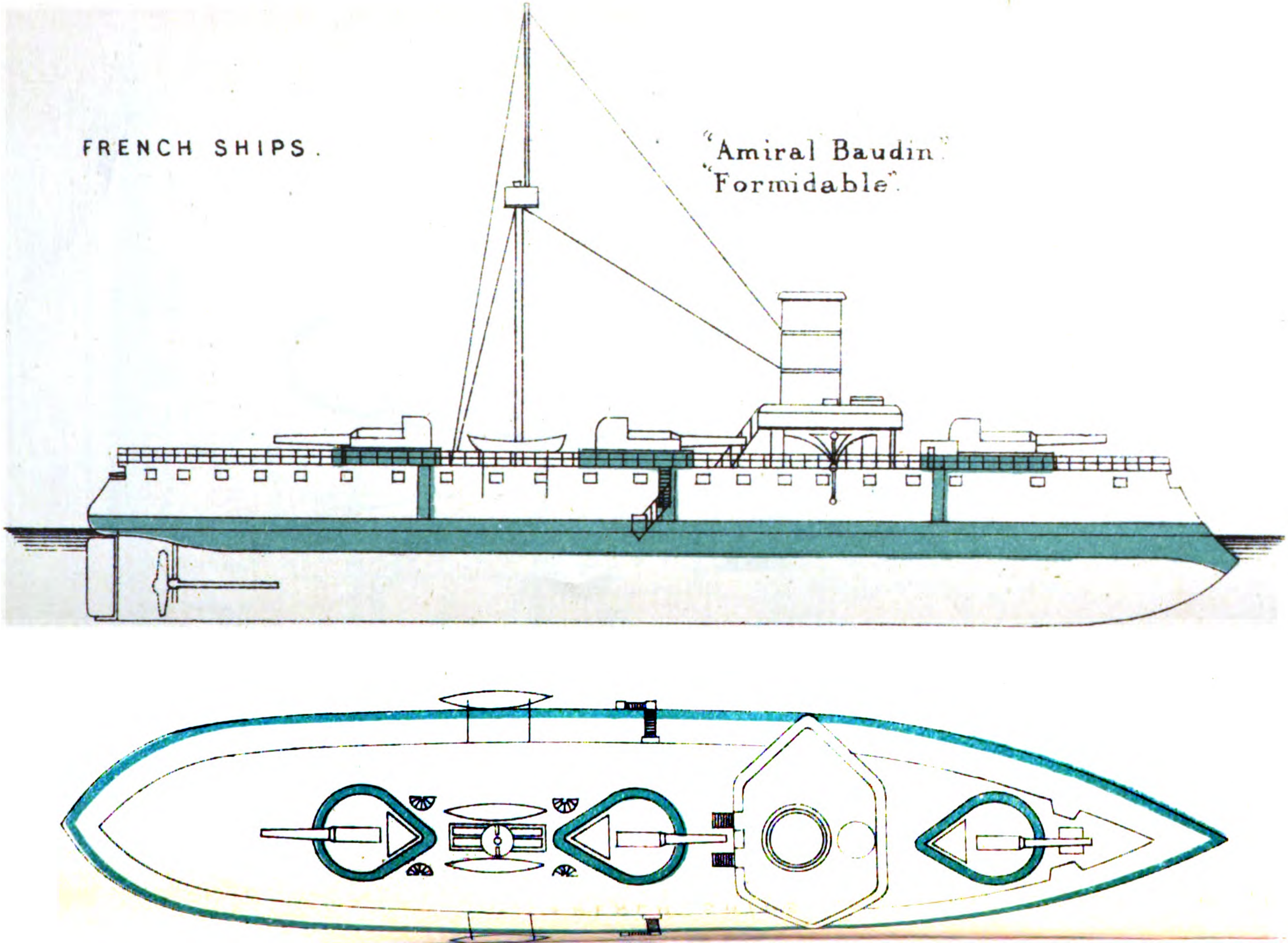
"Achéron"
"Cocyte".
"Phlegeton"
"Styx".



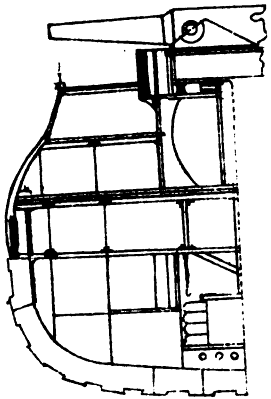
Pl. 46

FRENCH SHIPS.

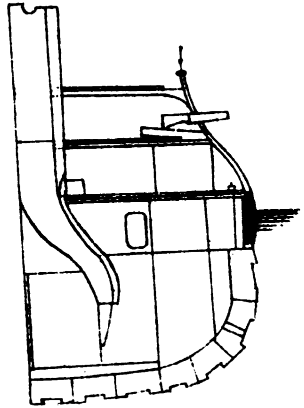
"Amiral Baudin"
"Formidable".

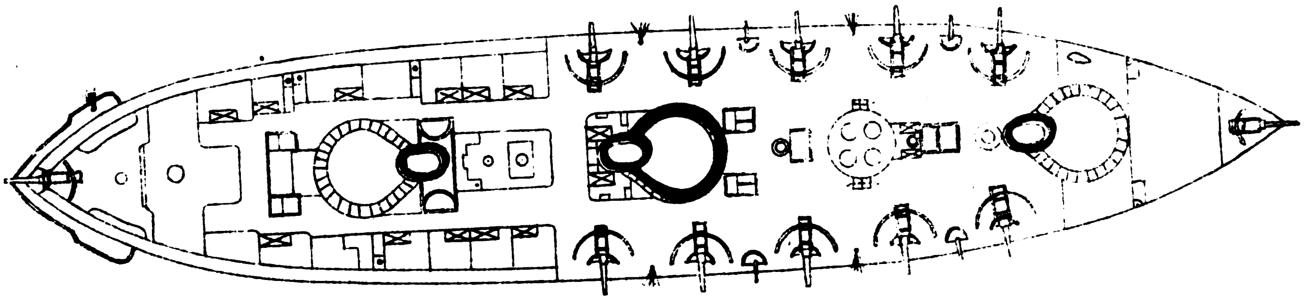


FRENCH SHIPS.



"Amiral Baudin."
Formidable.

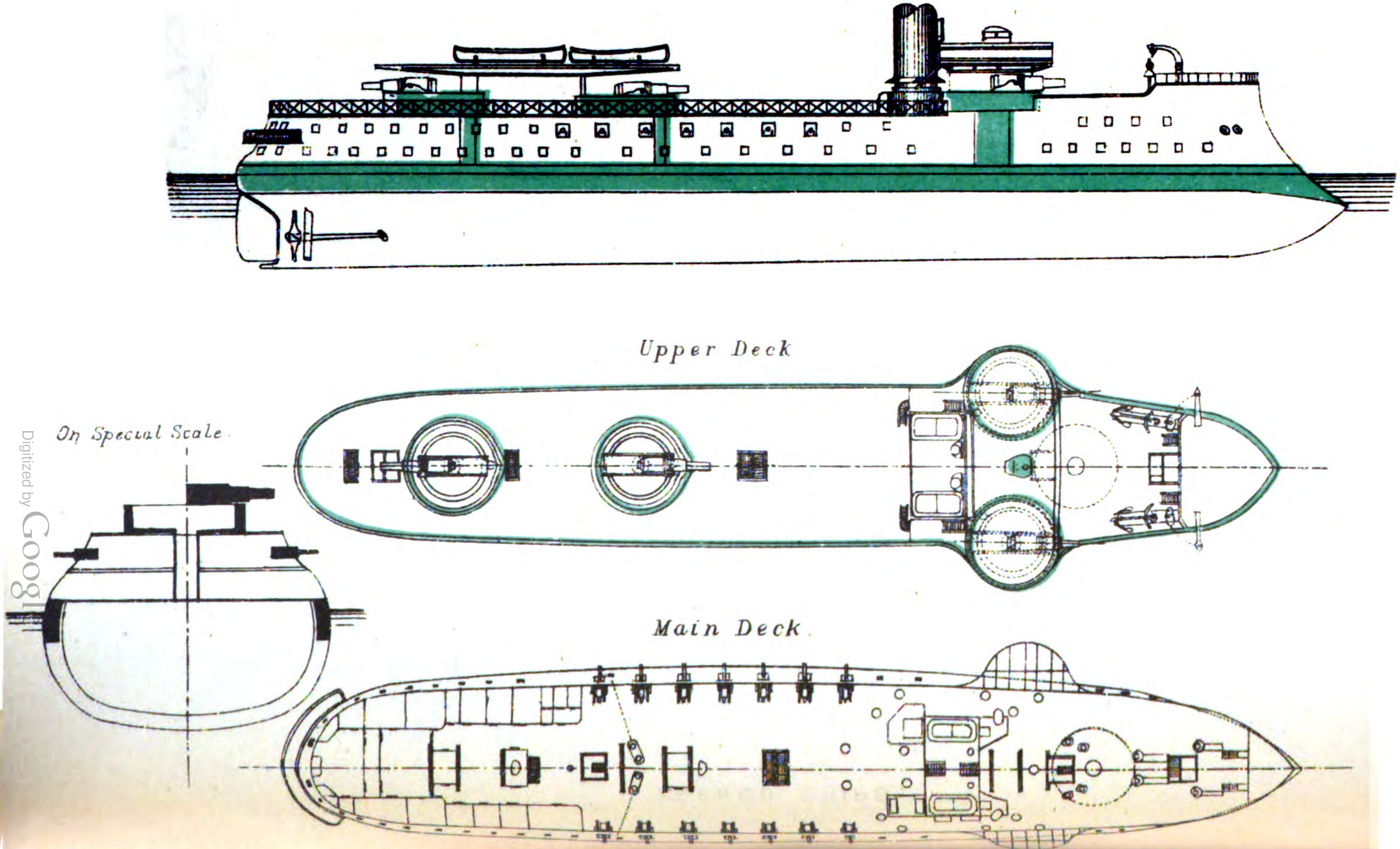




Plan of Secondary Battery.

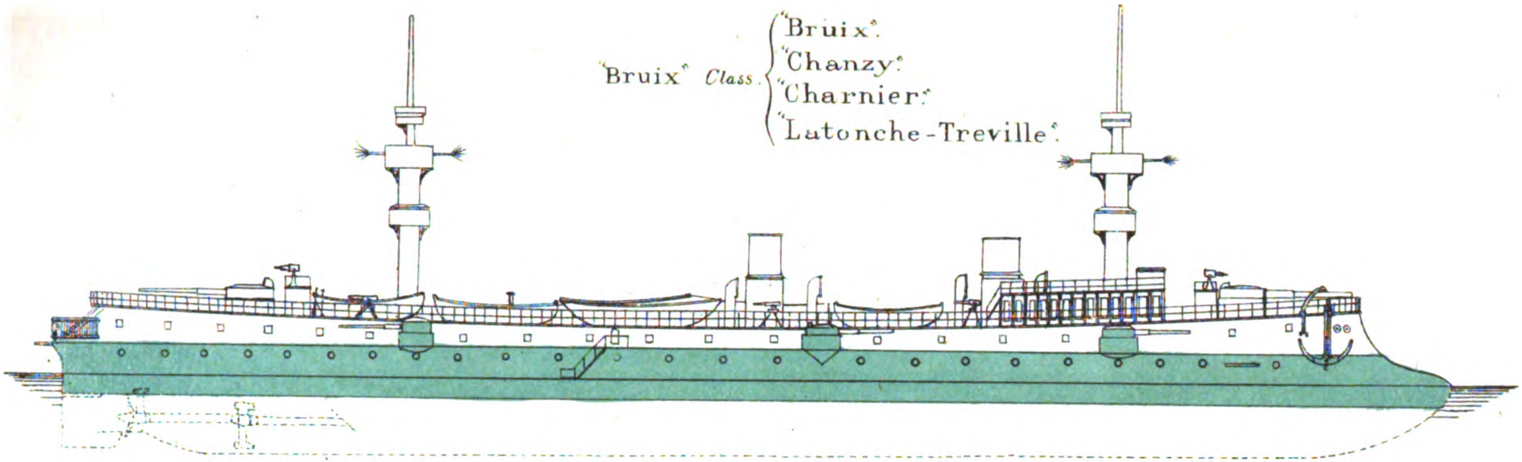
Hanhart Lith

FRENCH SHIPS. Amiral Duperre

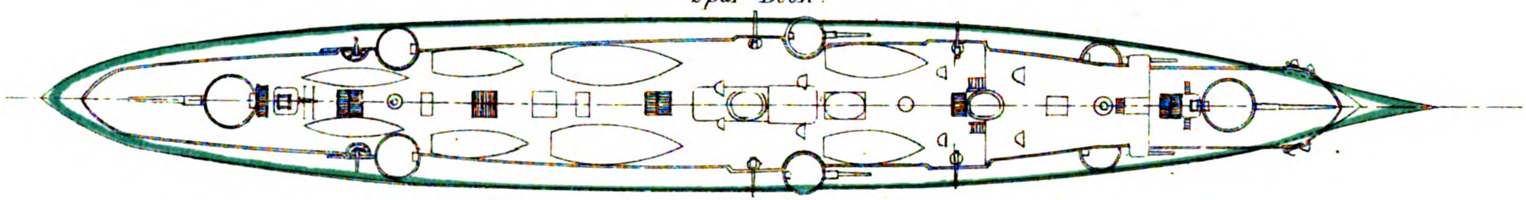


FRENCH SHIPS.

"Bruix" Class. { "Bruix". "Chanzy". "Charnier". "Latonche-Treville".



Spar Deck.

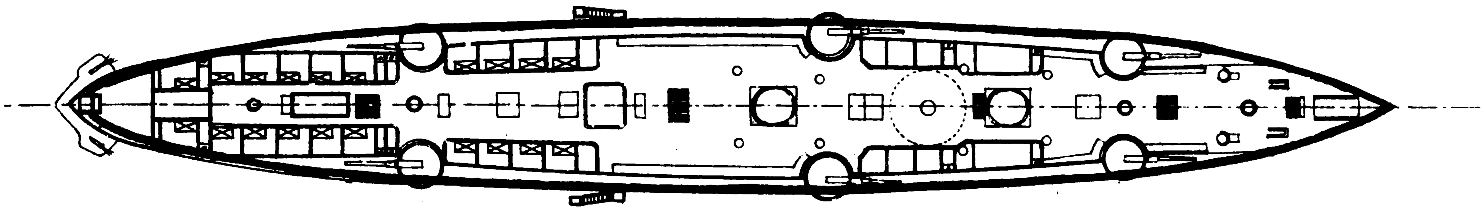


HANHART LITH.

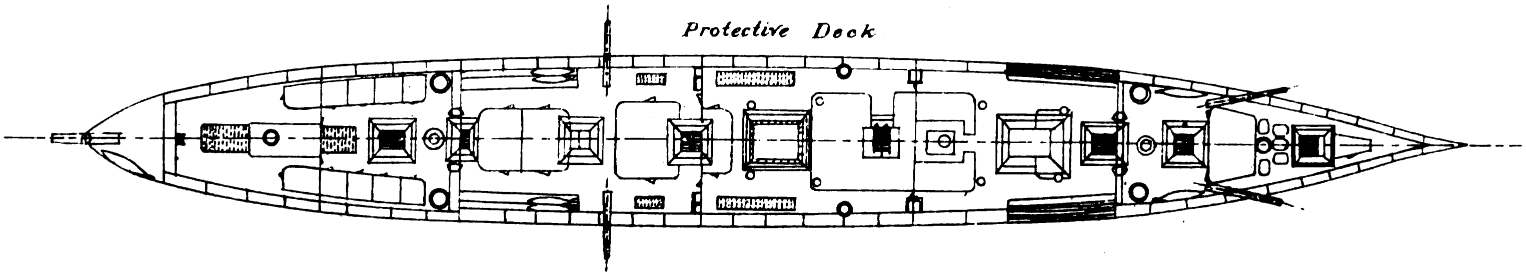
FRENCH SHIPS.

"Bruix" Class. { "Bruix". "Chanzy". "Charnier". "Latouche-Tréville".

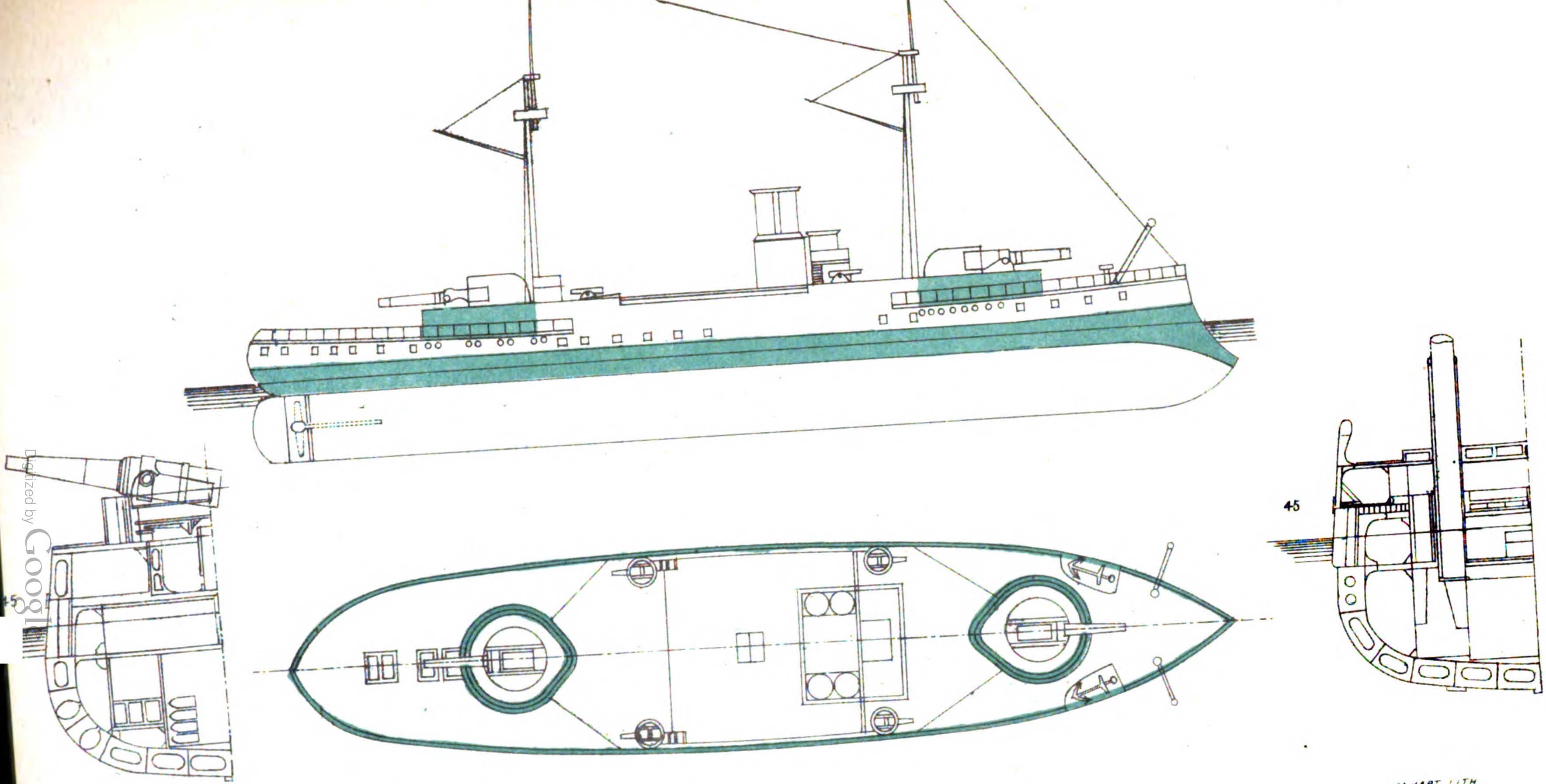
Upper Deck.



Protective Deck



"Requin."
"Terrible."

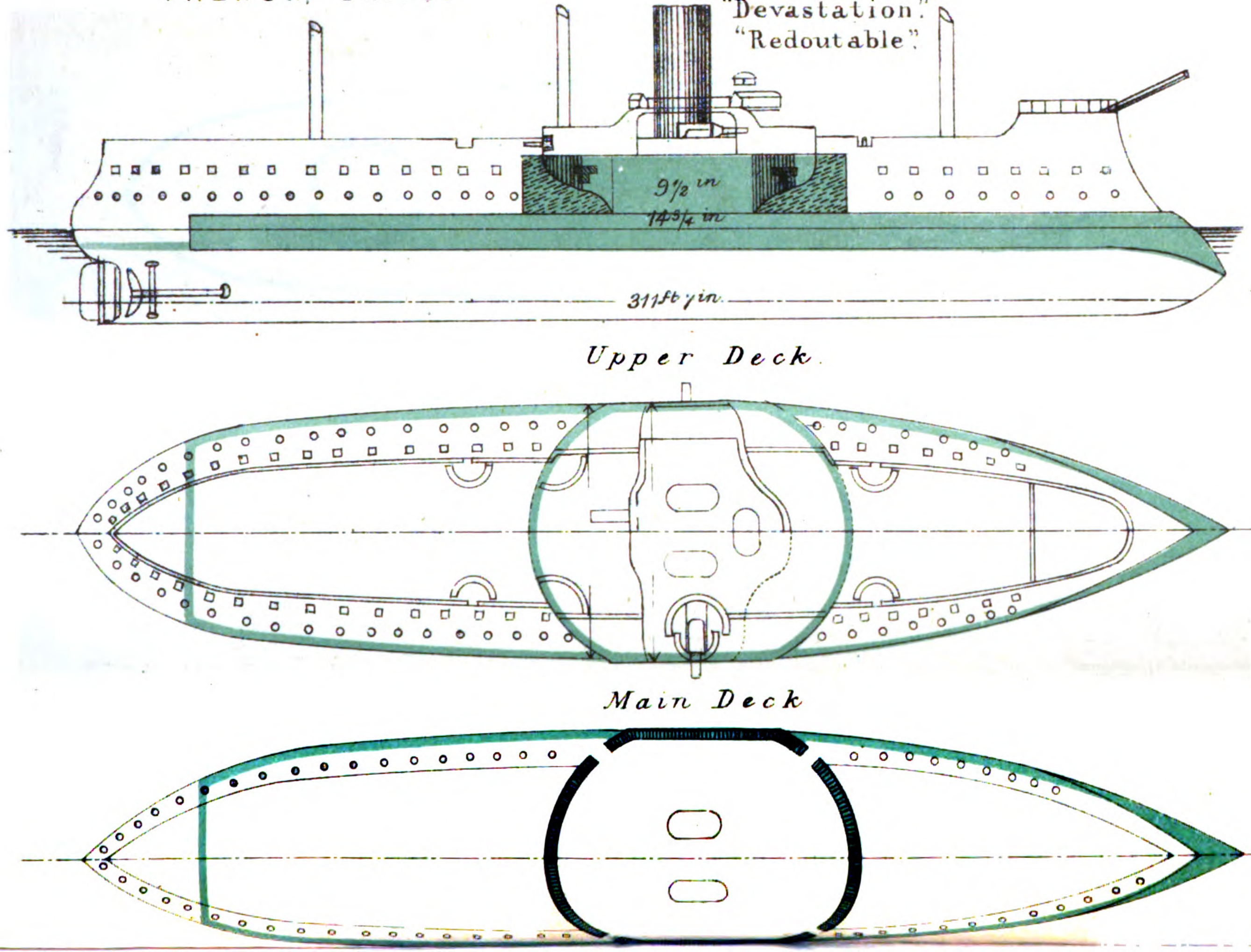


HANHART LITH.

Pl. 52

FRENCH SHIPS.

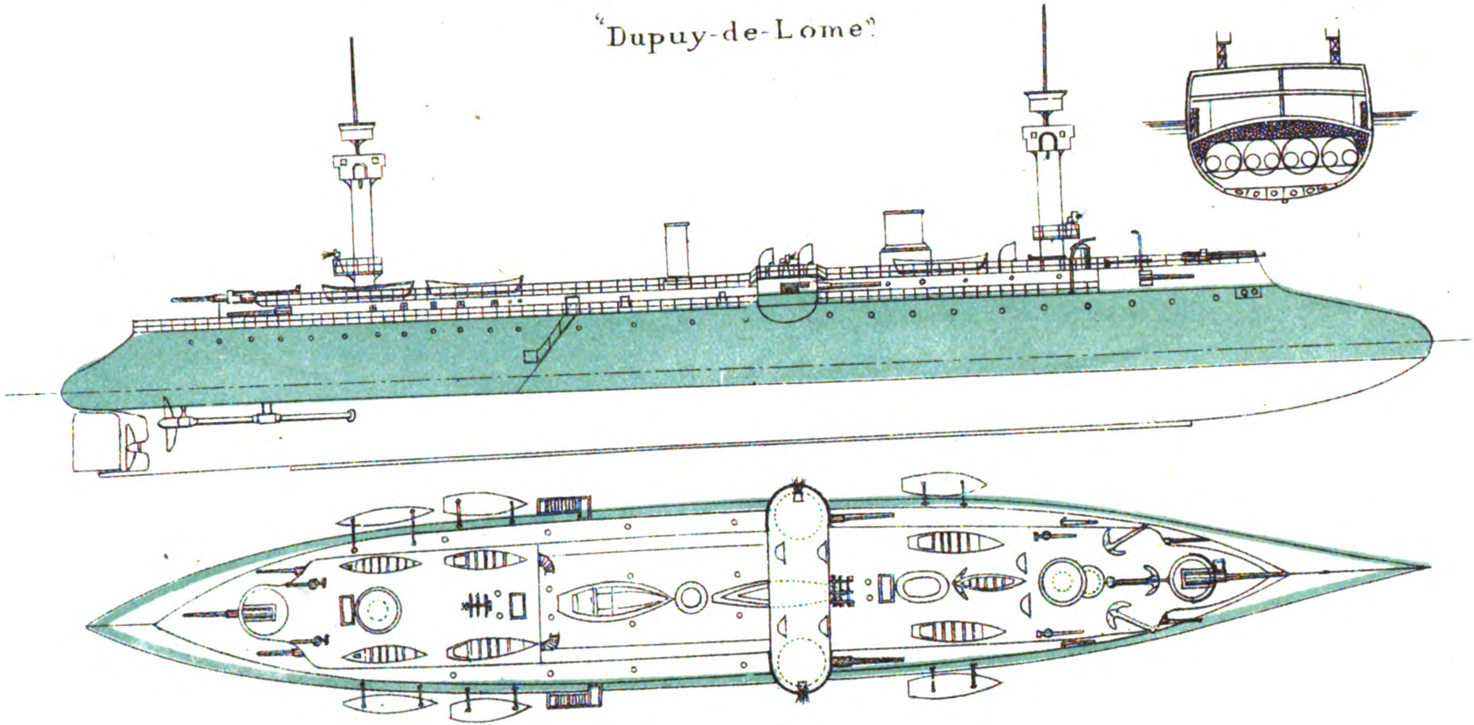
"Courbet".
"Devastation".
"Redoutable".



FRENCH SHIPS.

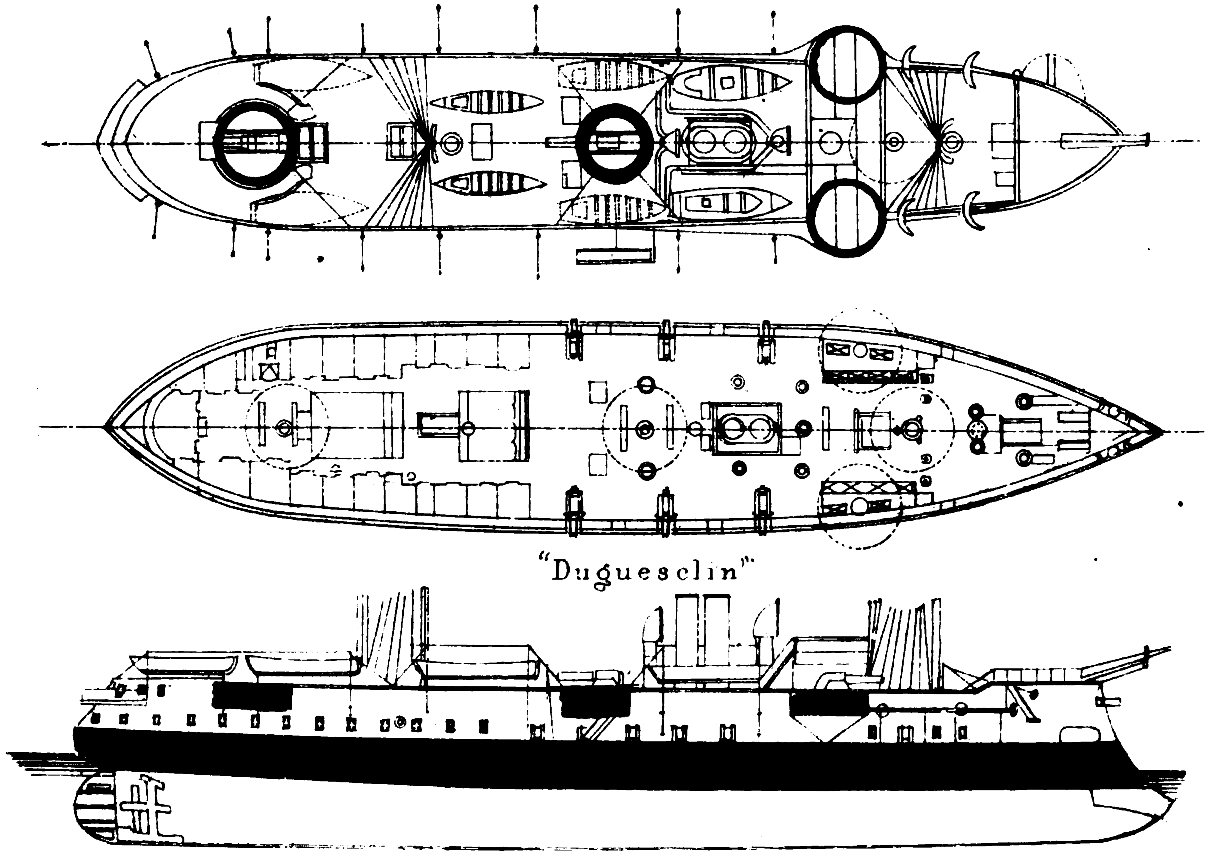
Armoured Cruiser.

"Dupuy-de-Lome".



HANHART LITH.

FRENCH SHIPS.

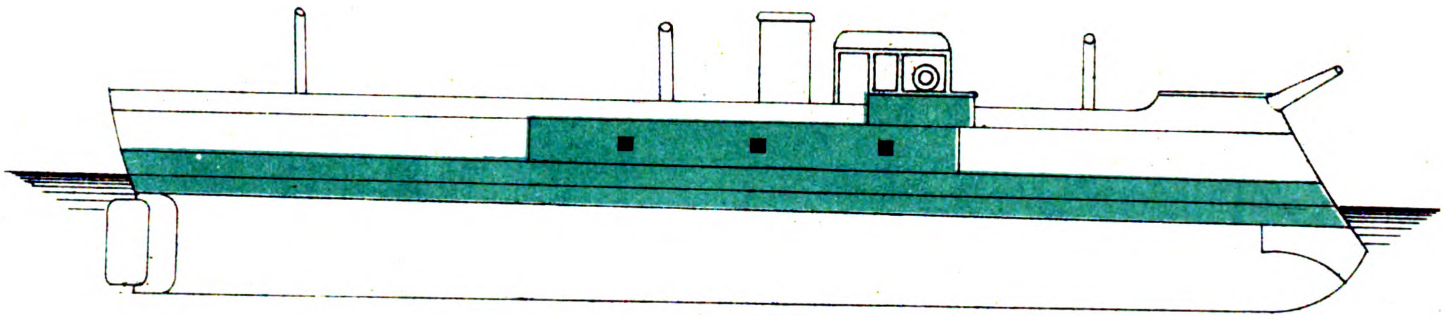


"Duguesclin"

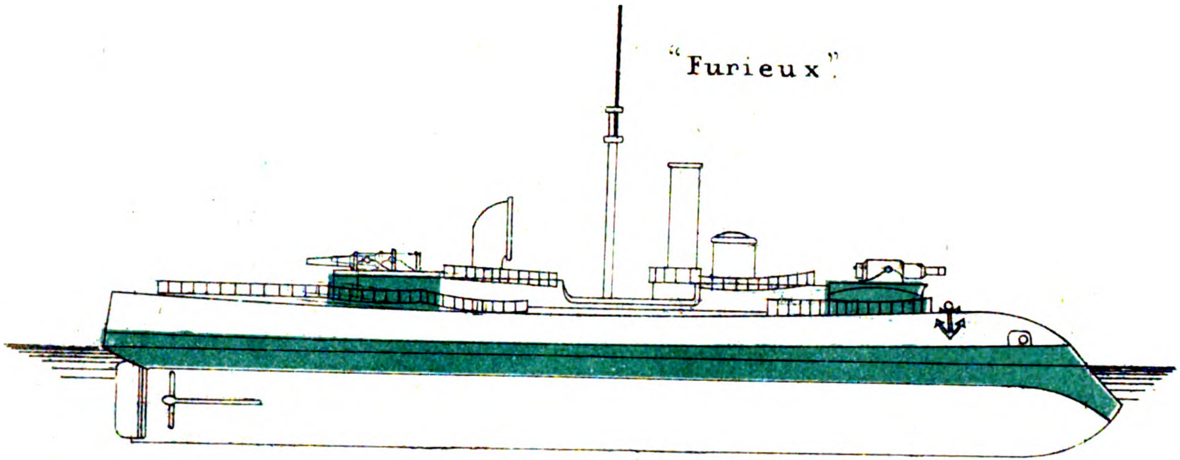
Pl. 55

FRENCH SHIPS.

"Friedland".

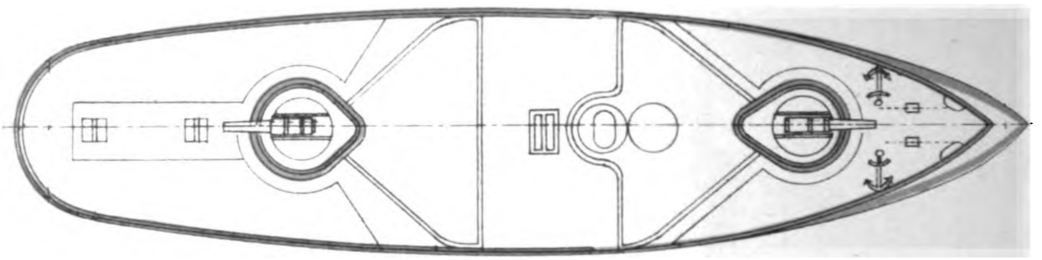


"Furieux".

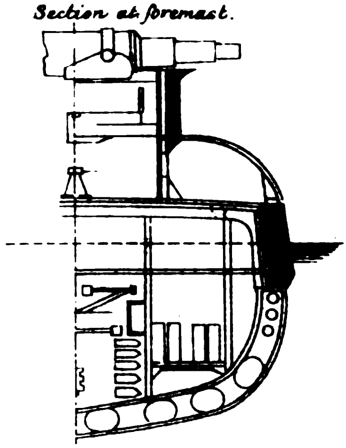


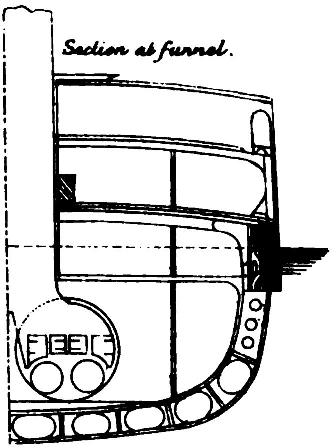
FRENCH SHIPS.

"Furieux"



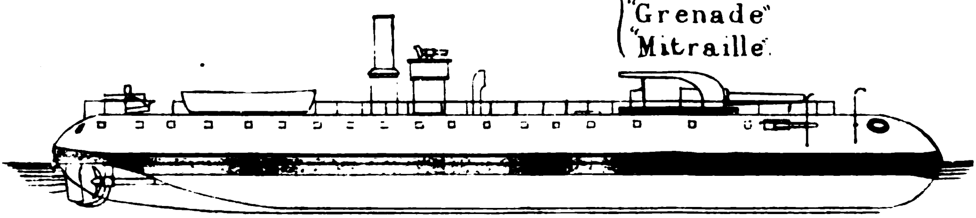
Section at foremast.

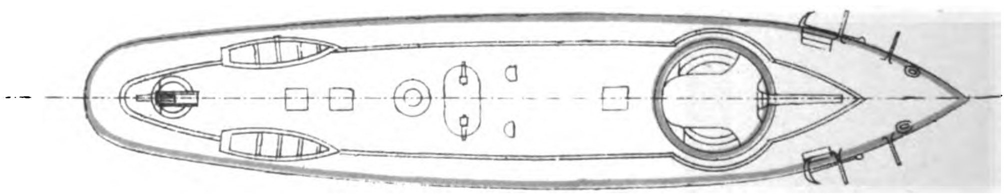


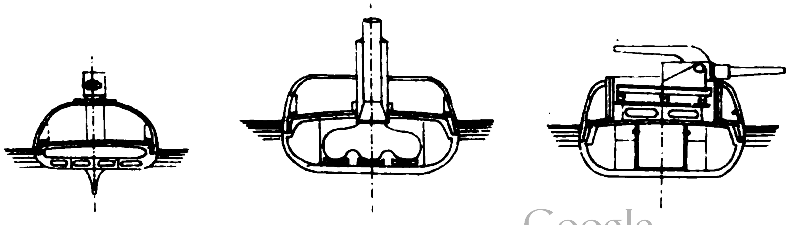


"Fusée" Class

"Flamme"
"Fusée"
"Grenade"
"Mitraille"





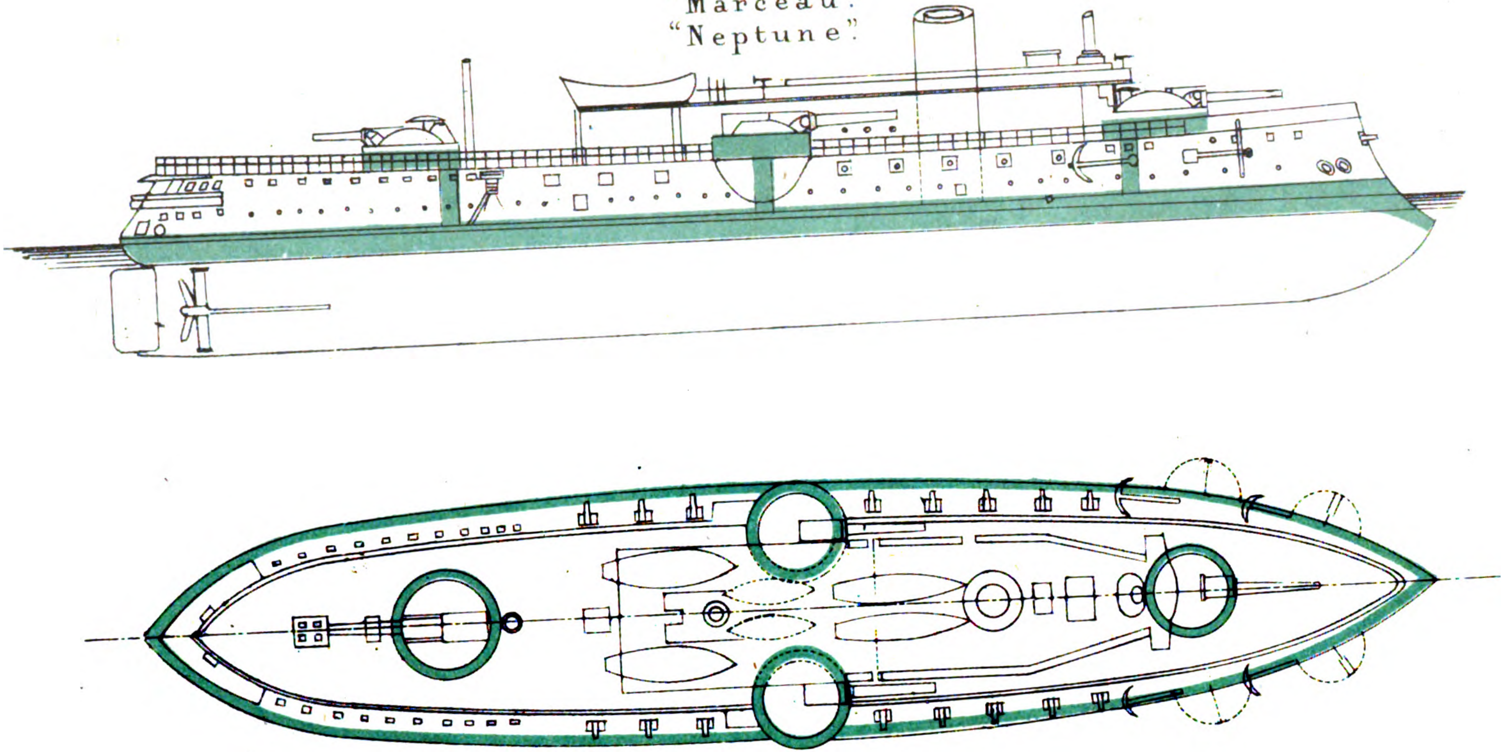


HANHART LITH

Pl. 57

FRENCH SHIPS.

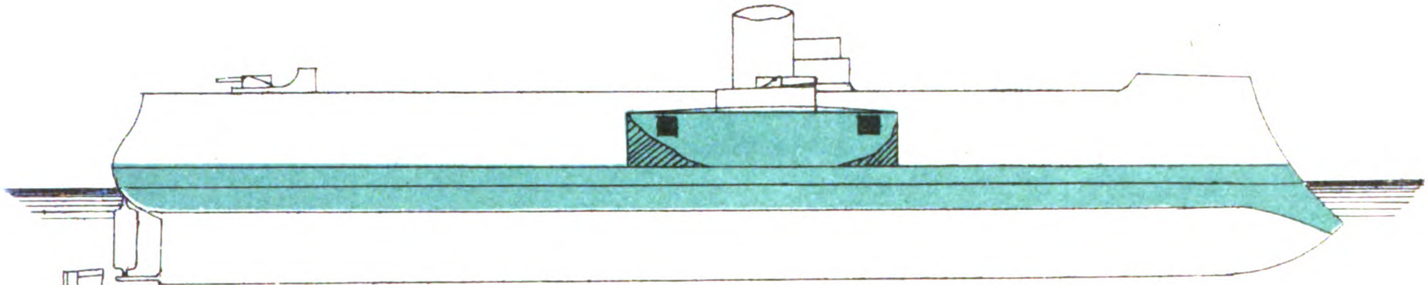
"Hoche".
"Magenta."
"Marceau."
"Neptune."



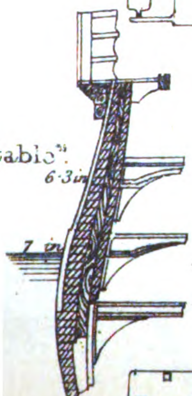
Nanhart Lith

FRENCH SHIPS.

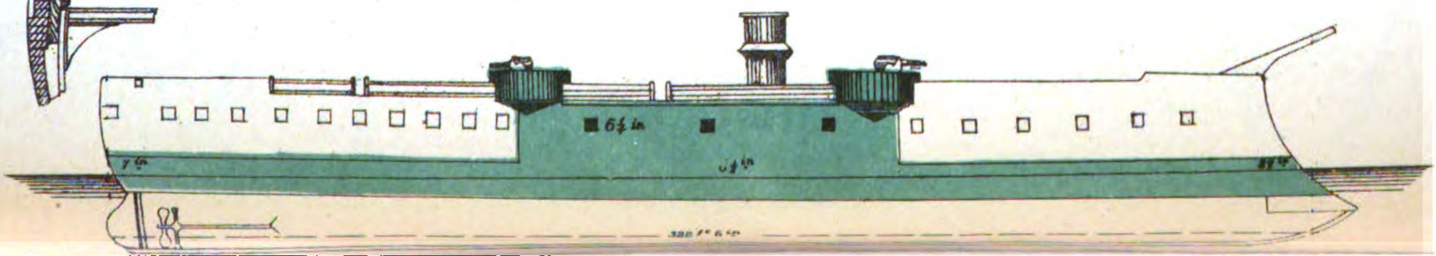
"Redoutable"
(See also Pl. 52.)



"Redoutable".

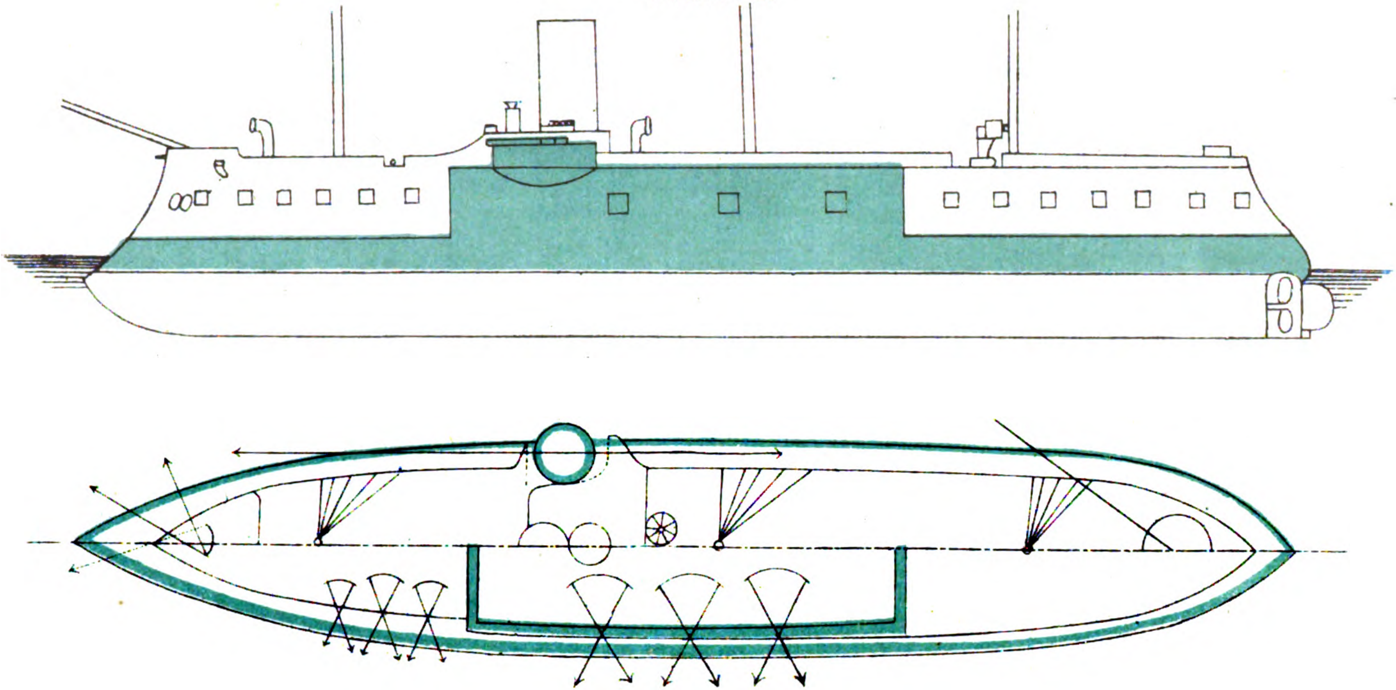


"Richelieu"



FRENCH SHIPS.

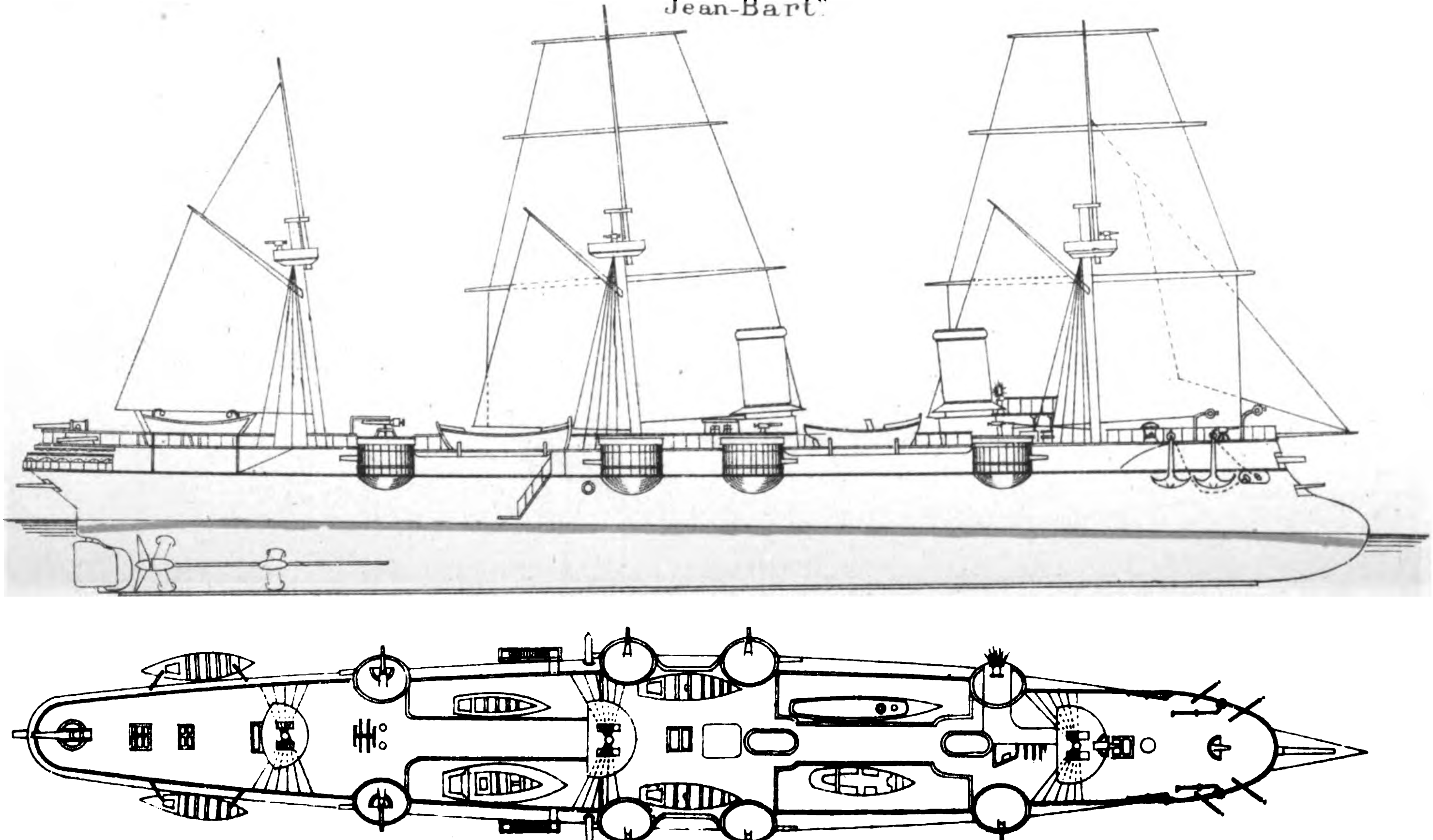
"Trident."
"Colbert."



FRENCH SHIPS

Protected Cruiser.

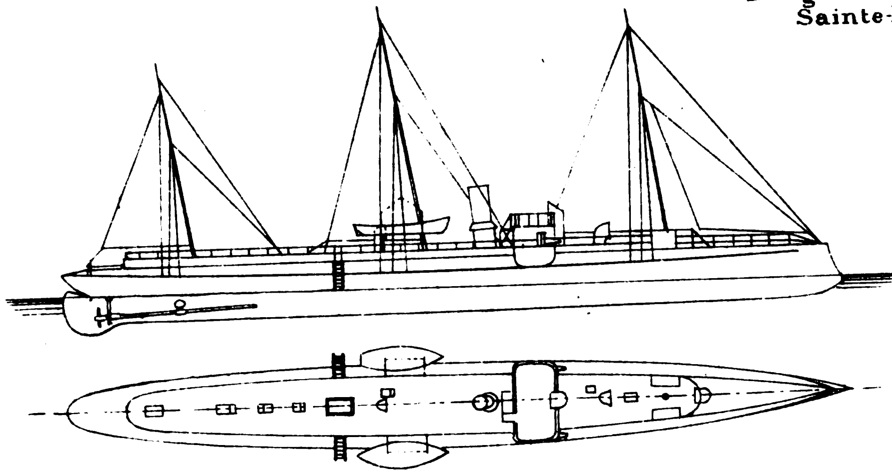
"Alger."
"Isly."
"Jean-Bart."

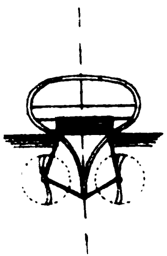


HANHART LITH

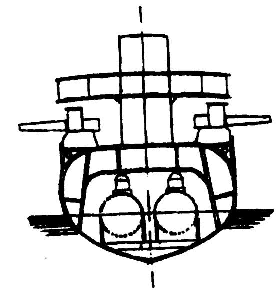
FRENCH SHIPS.

"Bombe, Couleuvrine, Dague."
Dragonne, Flèche, Lance.
Sainte-Barbe. Salve.

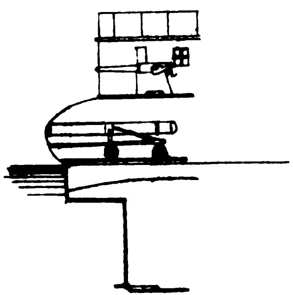




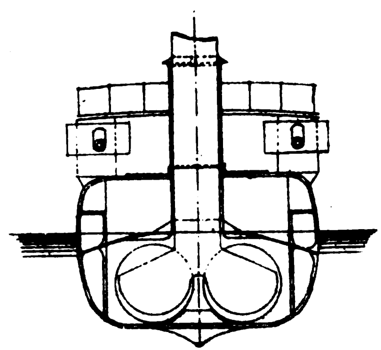
Section on A B



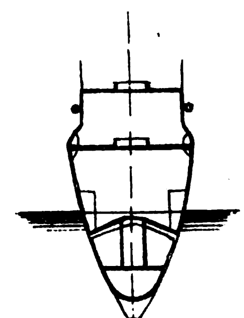
Section on E B.



Aft.



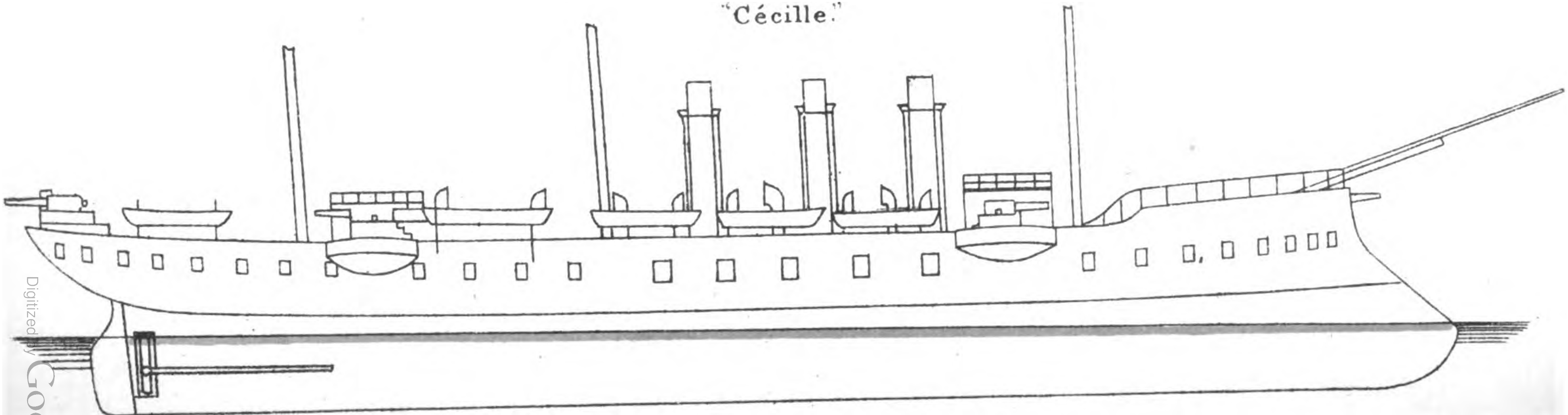
"Condor."
Before the Engine Room.



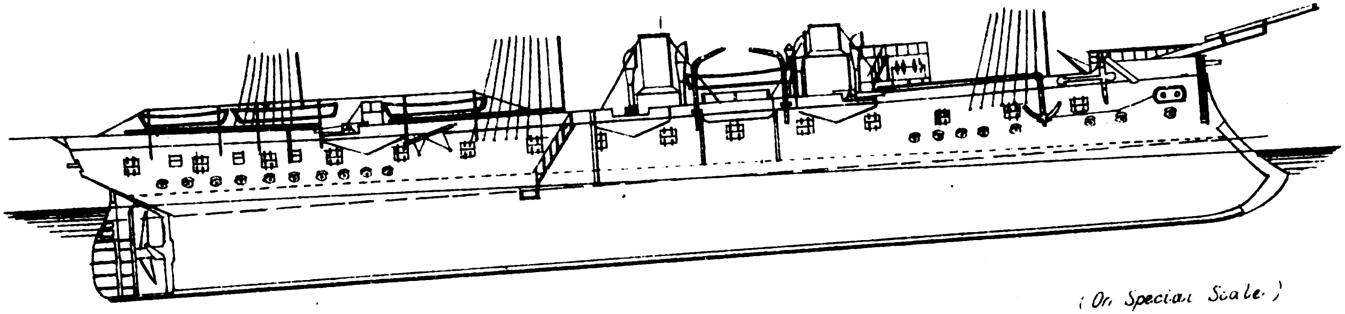
Forward.

FRENCH SHIPS.

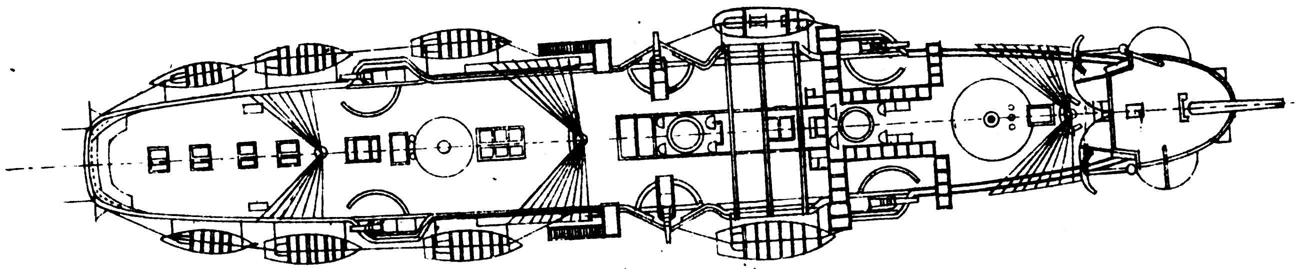
"Cécille."



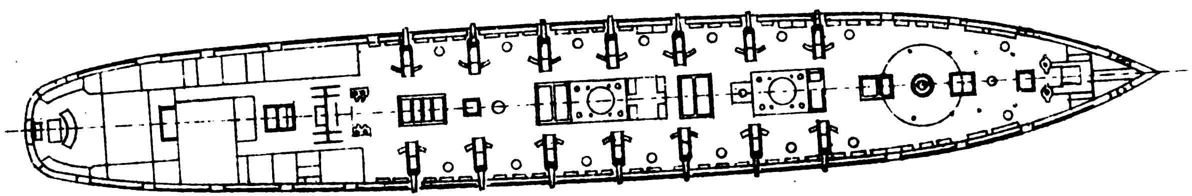
Hannart lith



(On Special Scale.)



(Upper Deck)



(Main Deck)

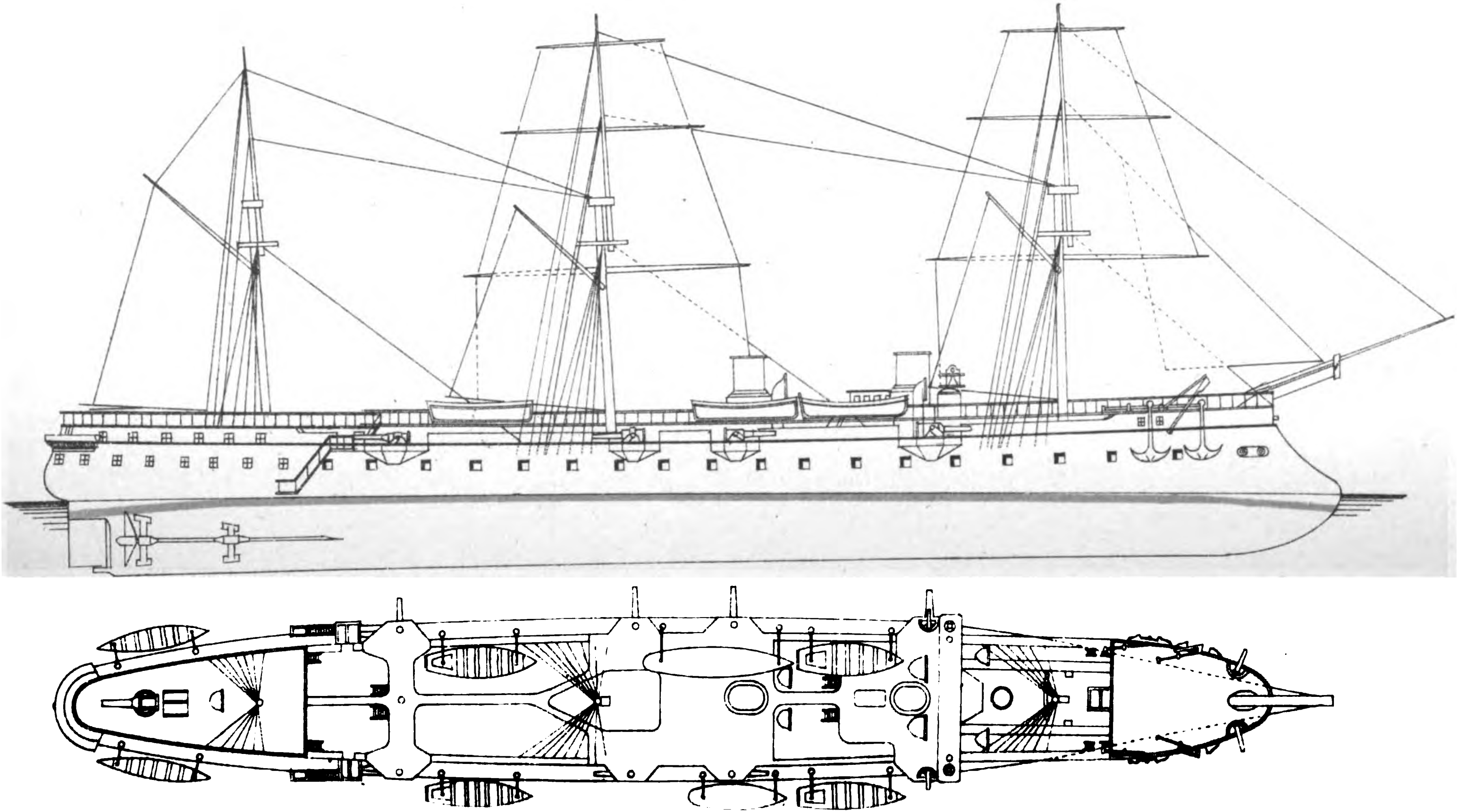
HANHART LITH.

RENCH SHIPS.

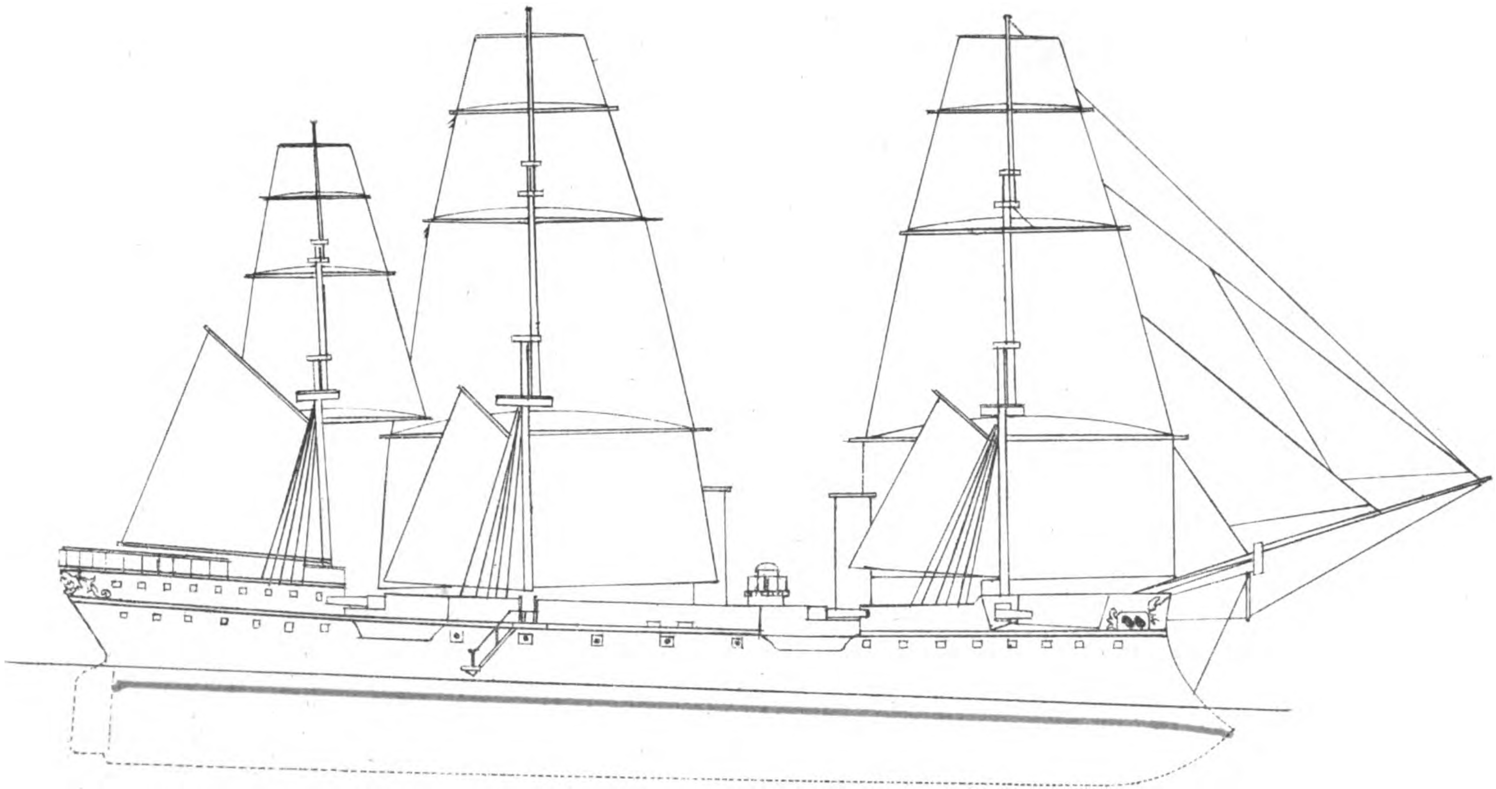
Protected Cruiser.

"Isly" & "Jean-Bart".

Pl. 64.



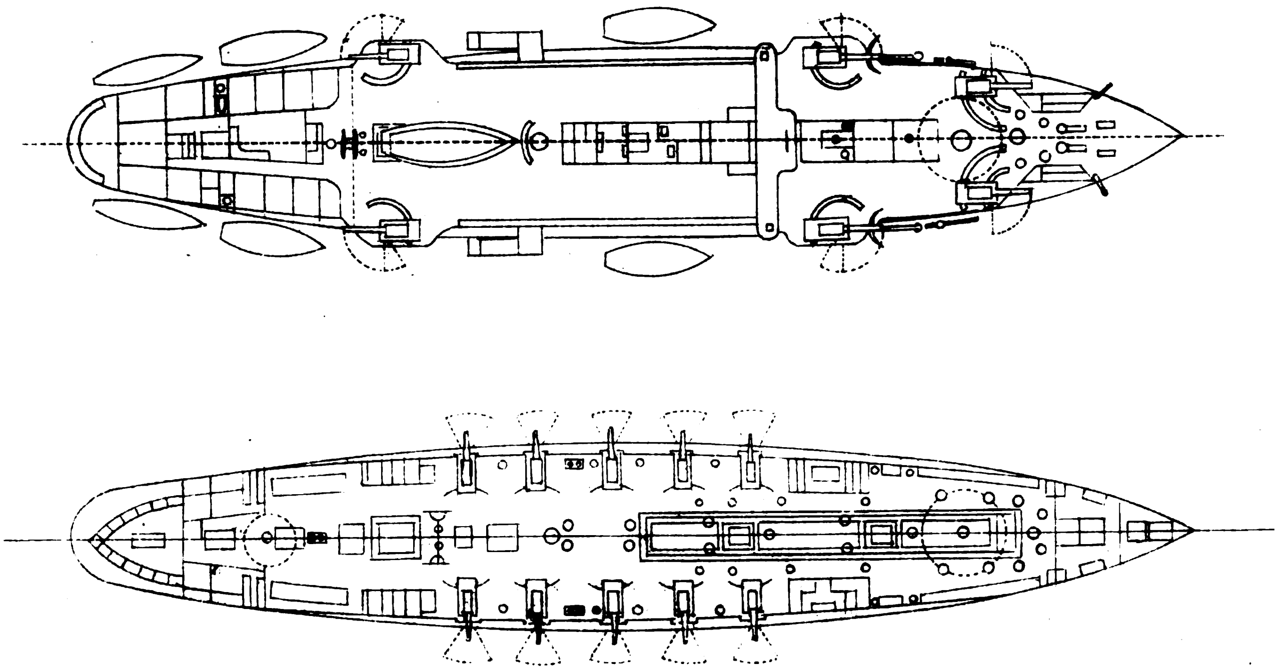
"Sfax" (Cruiser)



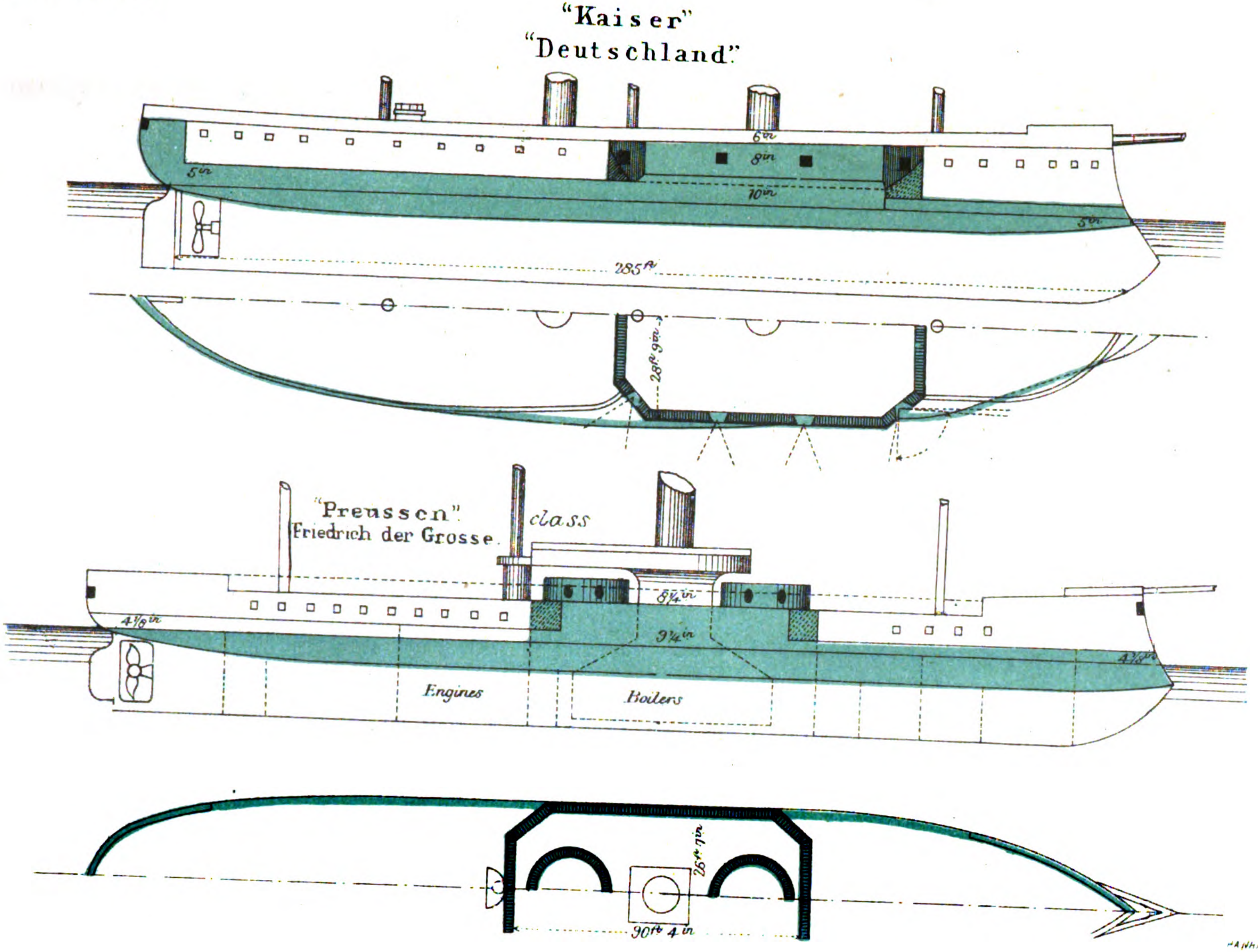
HANHART LITH

FRENCH SHIPS.

"Sfax." (Cruiser)



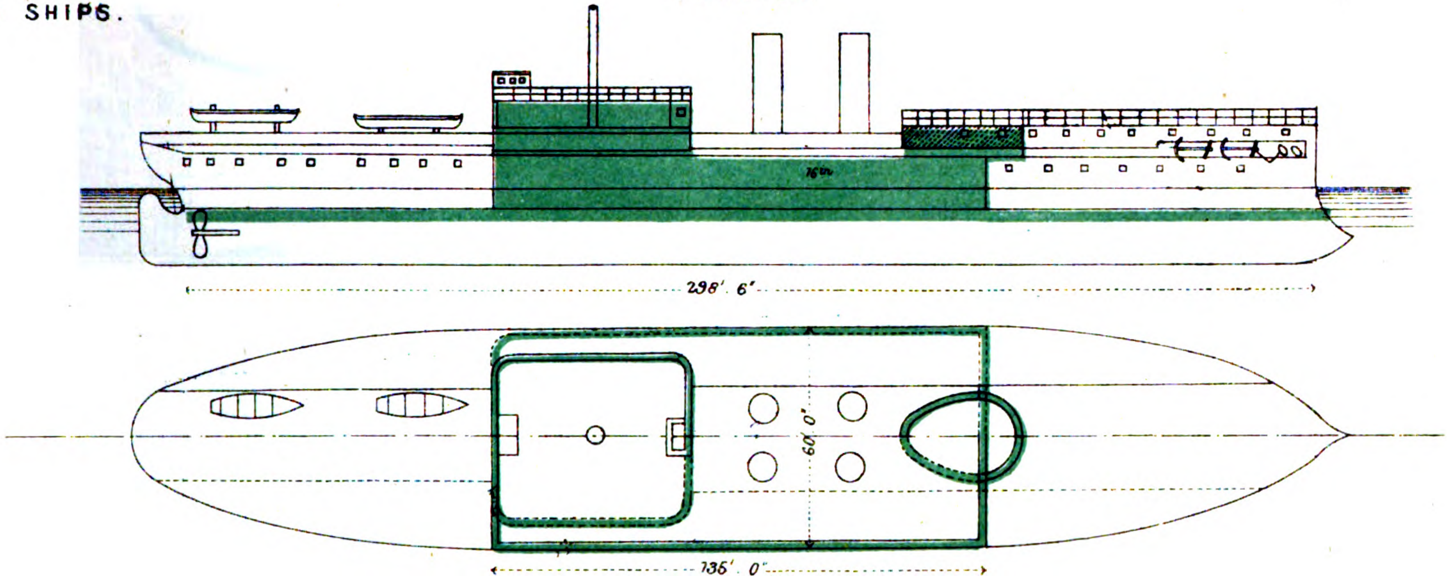
Pl. 67.


"Kaiser"
"Deutschland".
6 in
8 in
10 in
5 in
5 in
285 ft
28 ft 9 in
"Preussen" class
Friedrich der Grosse.
8¼ in
9¼ in
4⅛ in
4⅛ in
Engines
Boilers
26 ft 9 in
90 ft 4 in

GERMAN SHIPS.

"Sachsen"

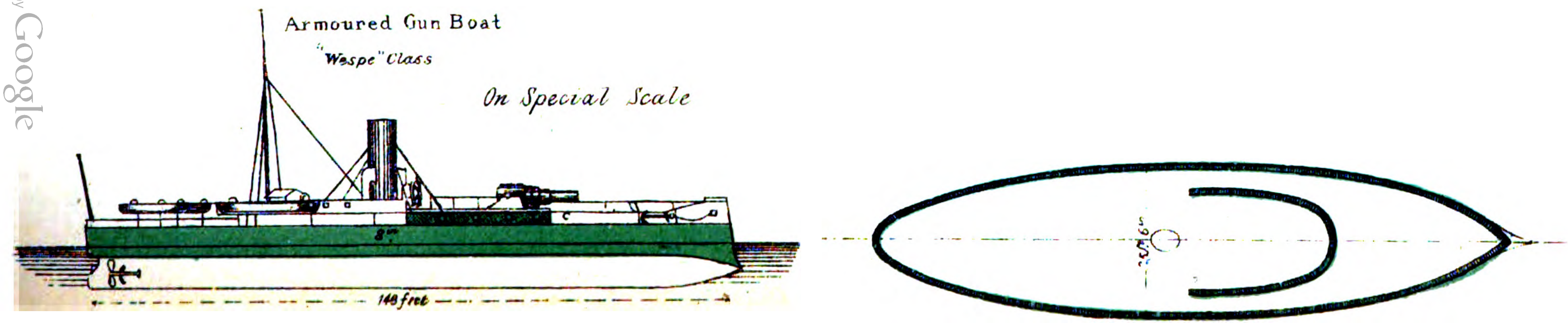
Pl 68



Armoured Gun Boat

"Wespe" Class

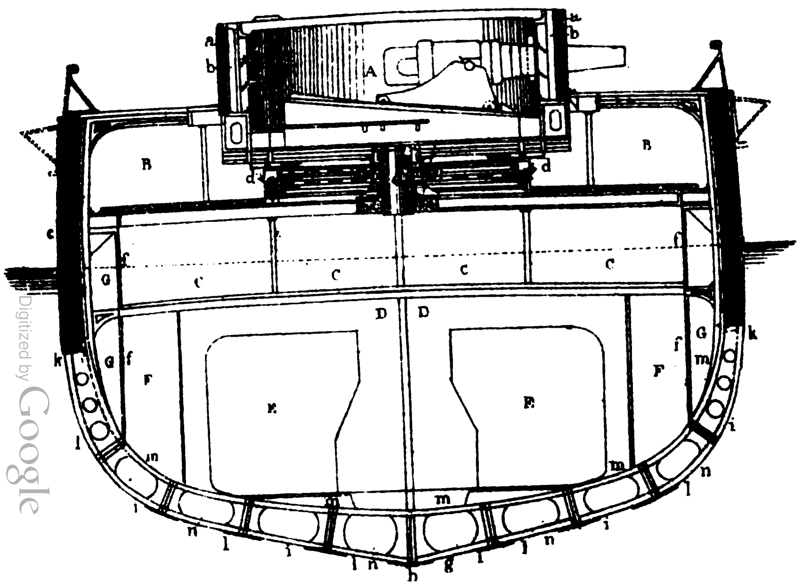
On Special Scale



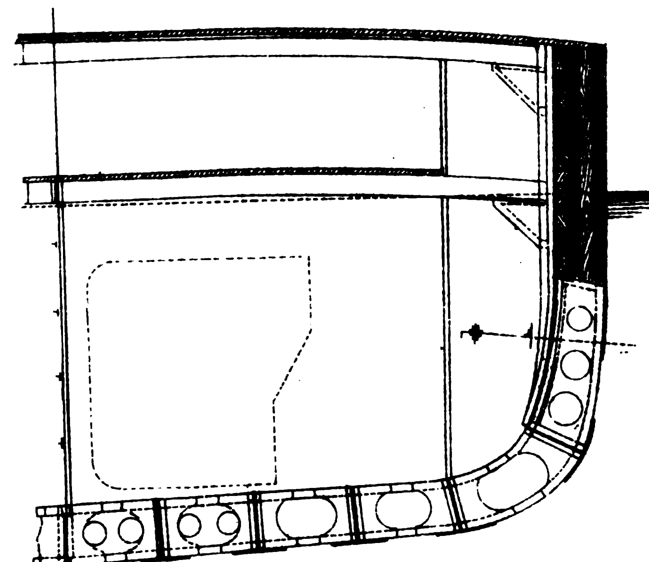
HANHART LITH

GERMAN SHIPS

Section through turret



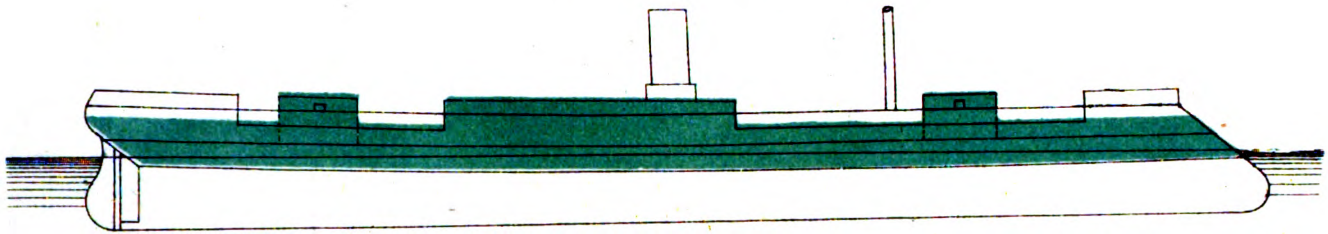
Half Midship Section "Sachsen"



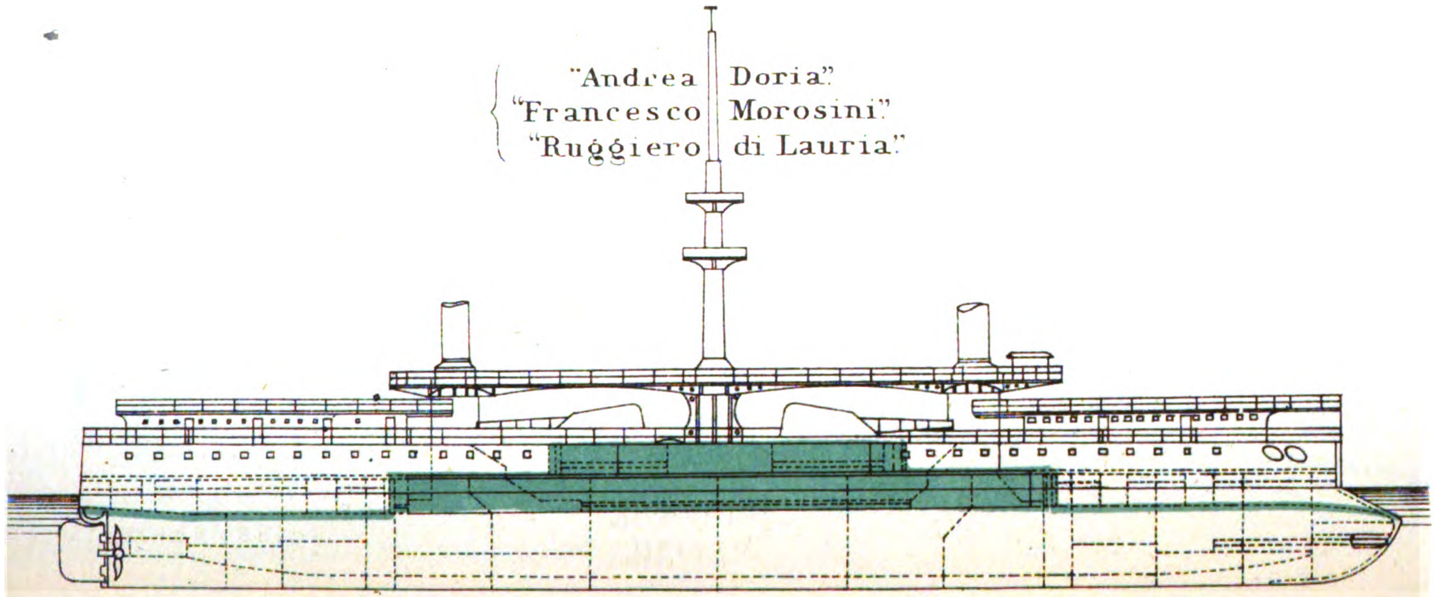
Hanhart Lith

ITALIAN SHIPS.

"Affondatore."



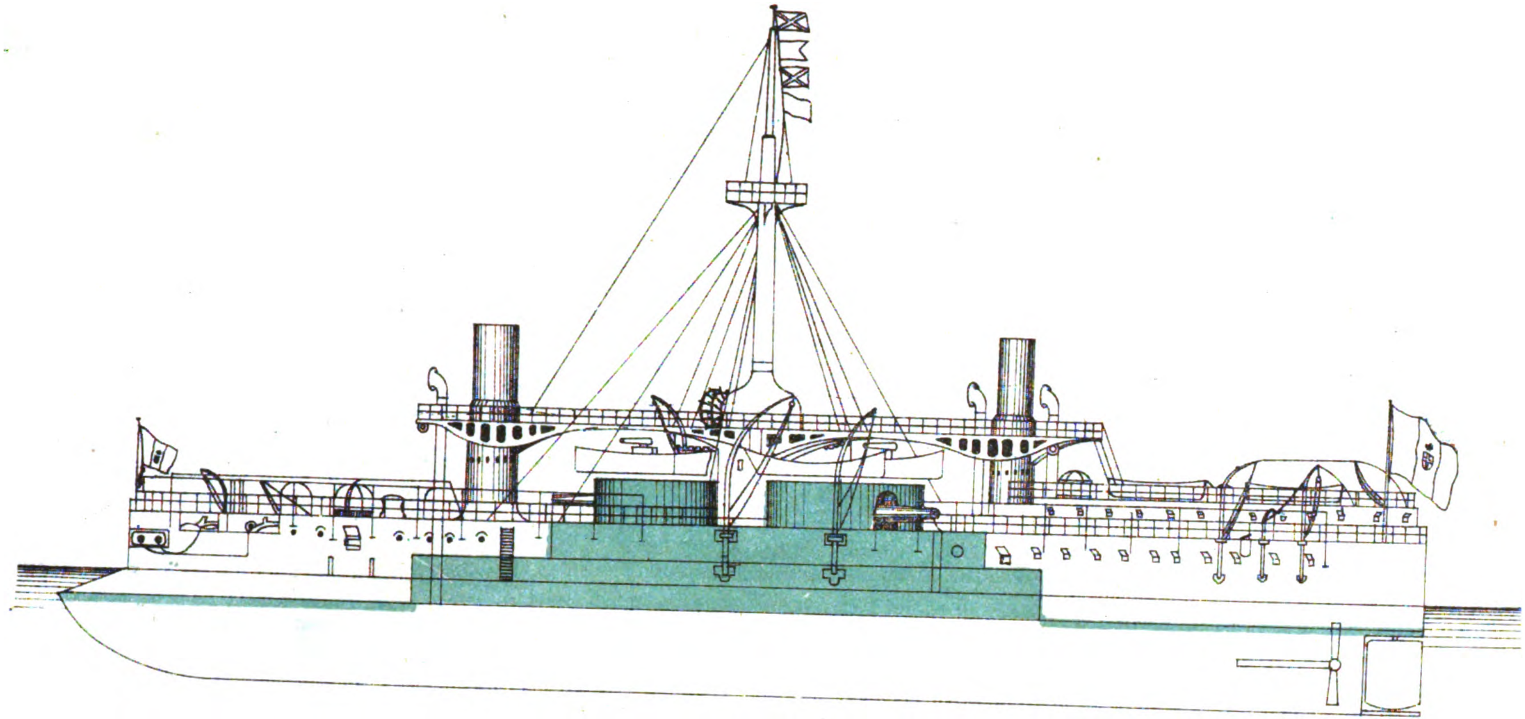
"Andrea Doria."
"Francesco Morosini."
"Ruggiero di Lauria."



ITALIAN SHIPS.

"Duilio."
"Dandolo."

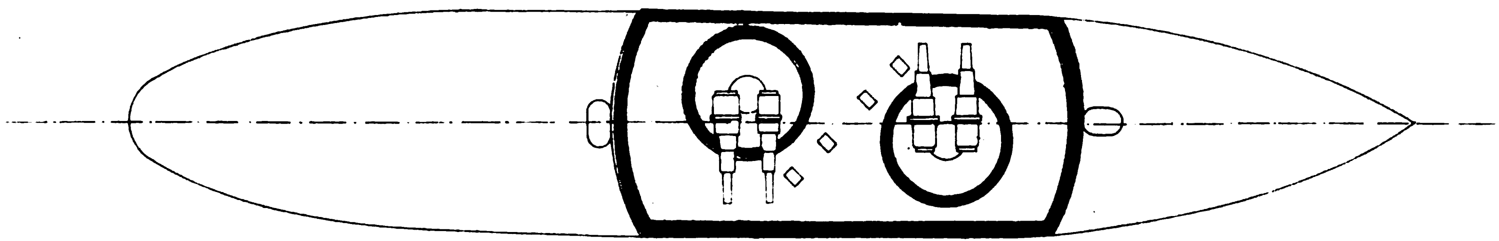
Pl. 71.



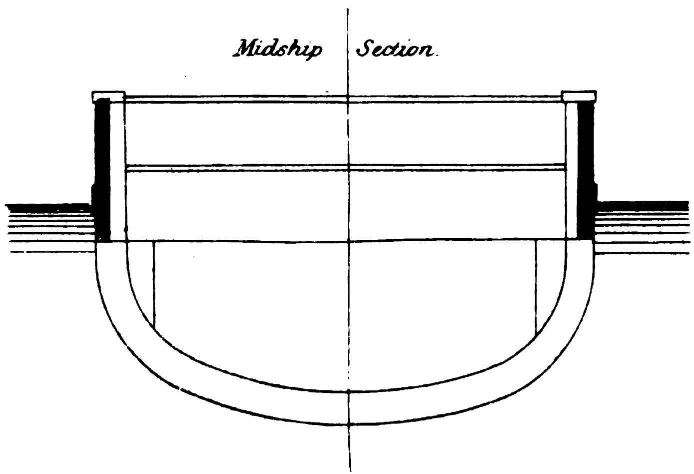
ITALIAN SHIPS.

"Duilio" & "Dandolo".

Deck Plan.

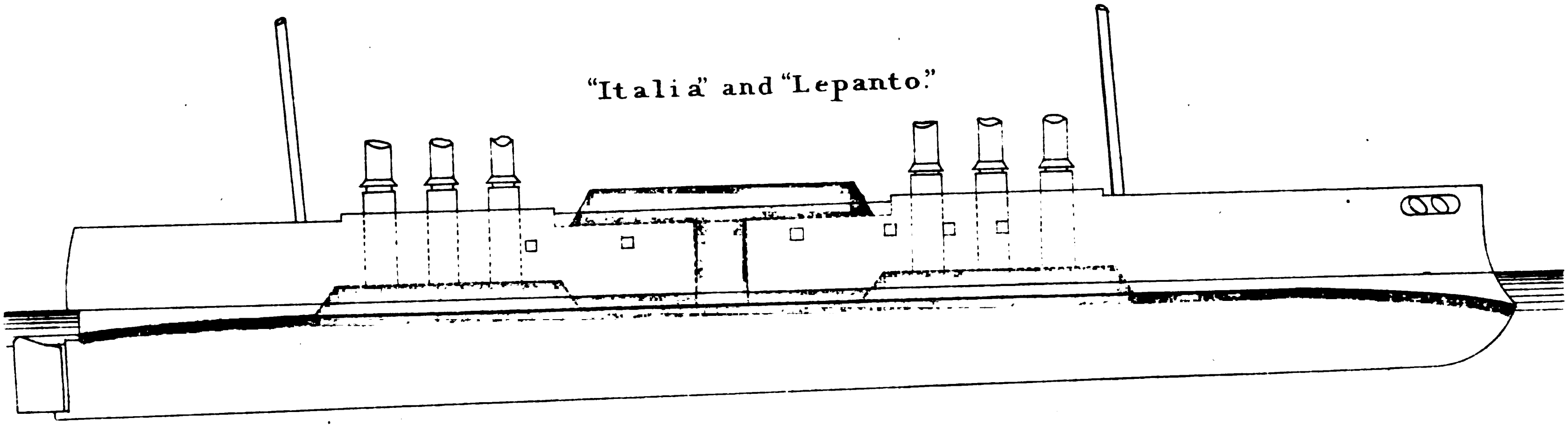


Midship Section.

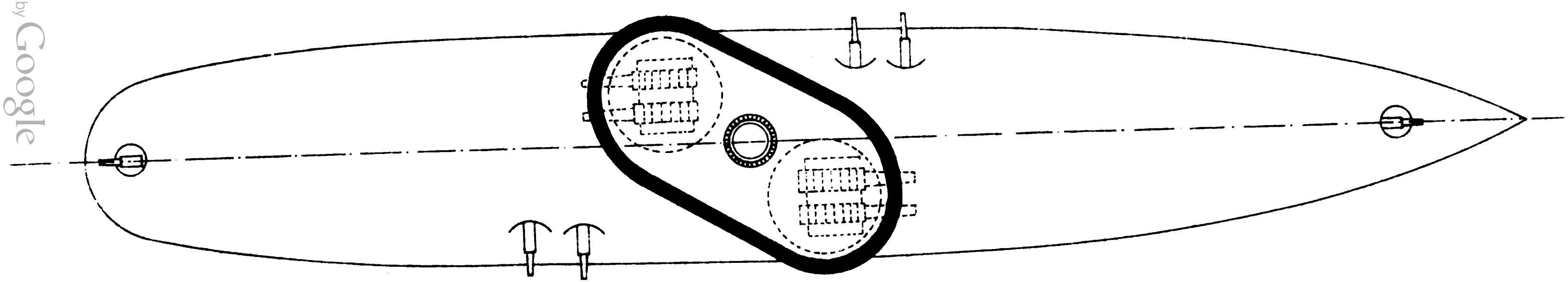


ITALIAN SHIPS.

"Italia" and "Lepanto."



Upper Deck.

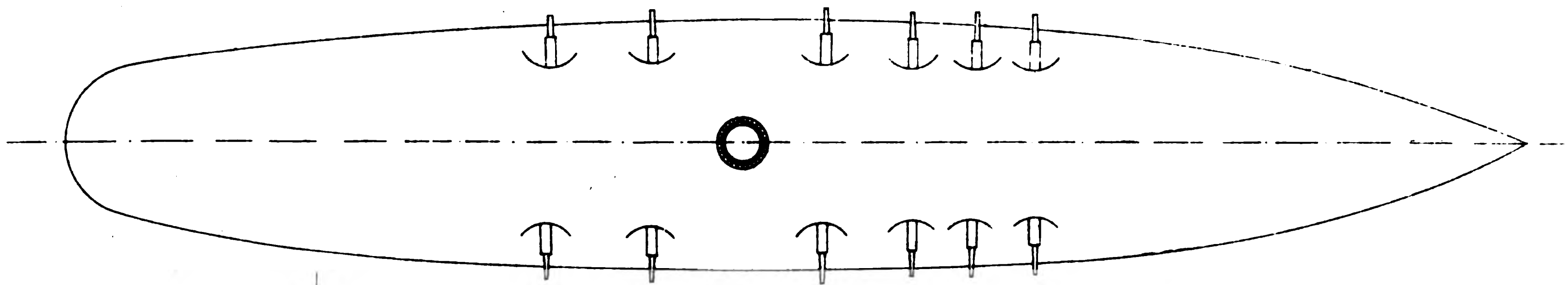


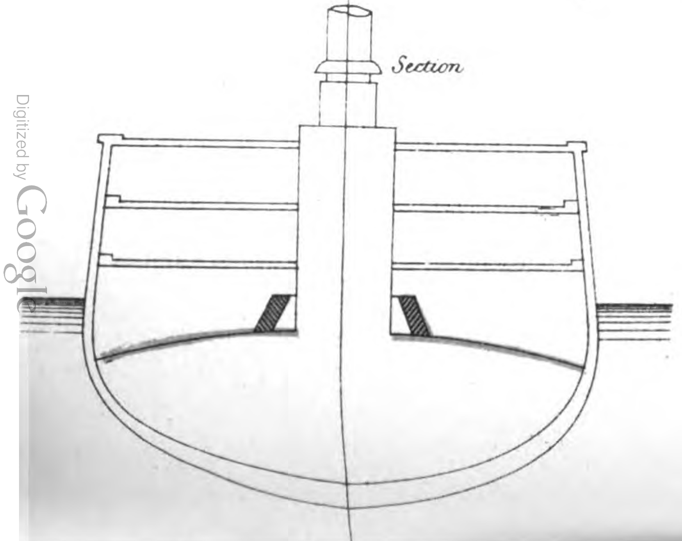
HANHART LITH

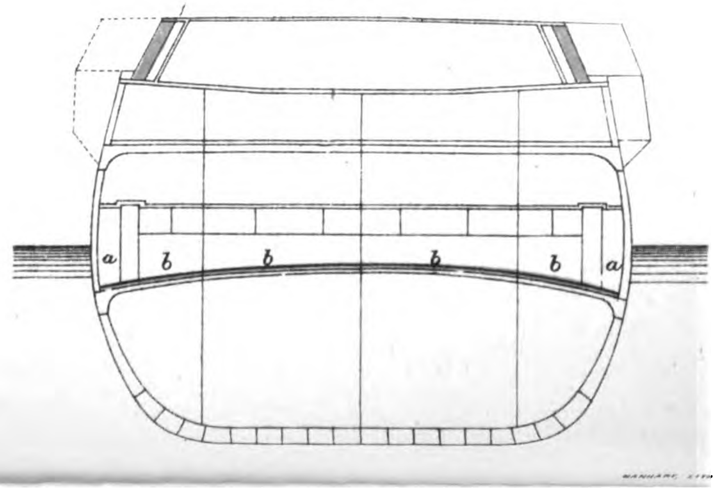
ITALIAN SHIPS.

"Italia."

Main Deck.

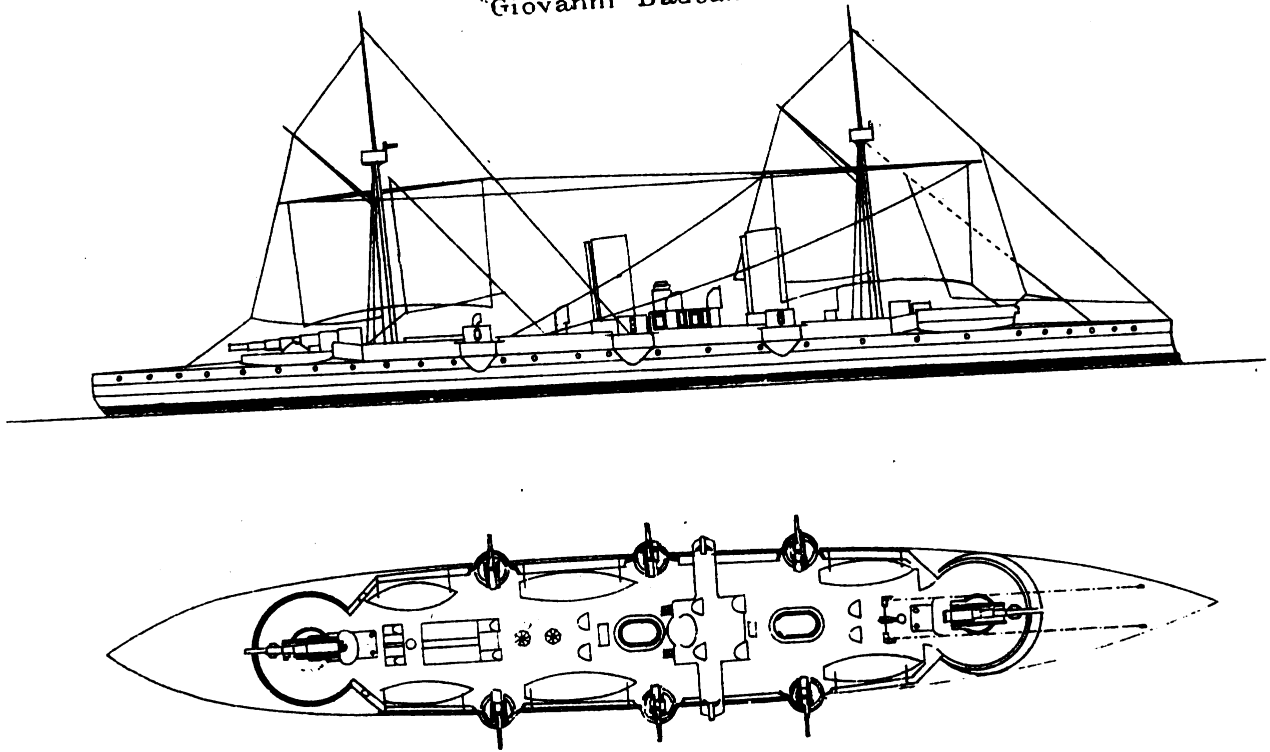






ITALIAN SHIPS.

"Giovanni Bausan."

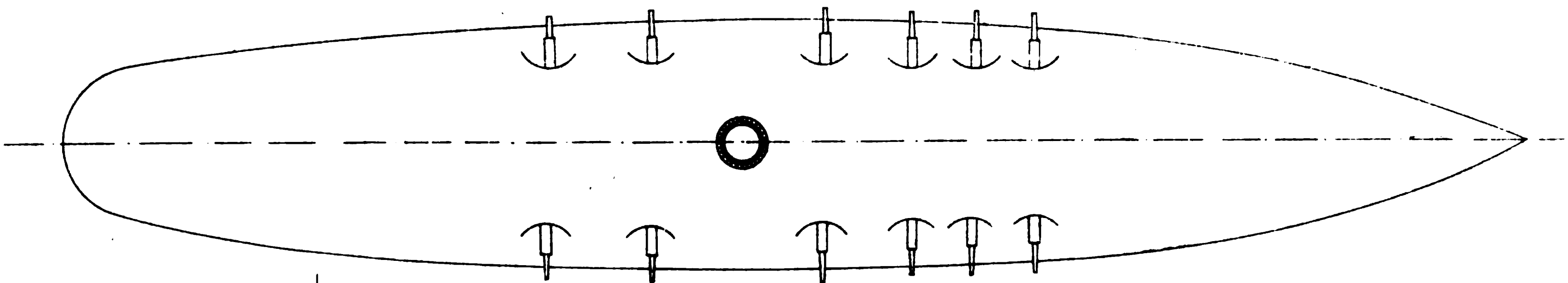


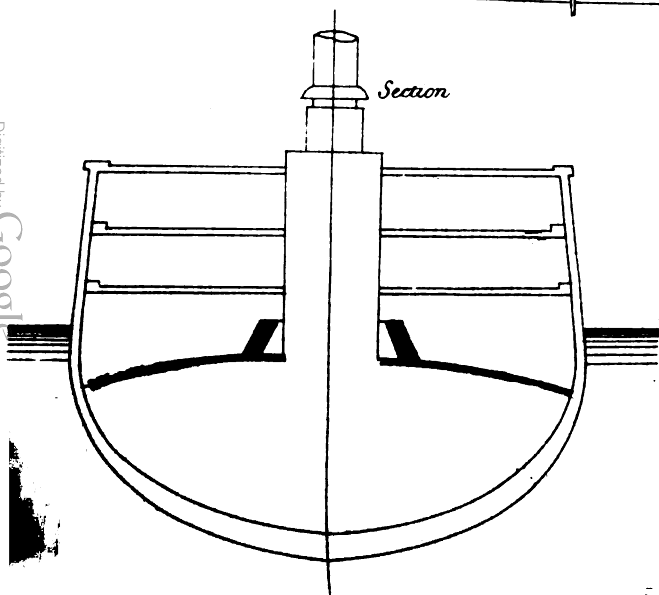
MANHART, LITH.

ITALIAN SHIPS.

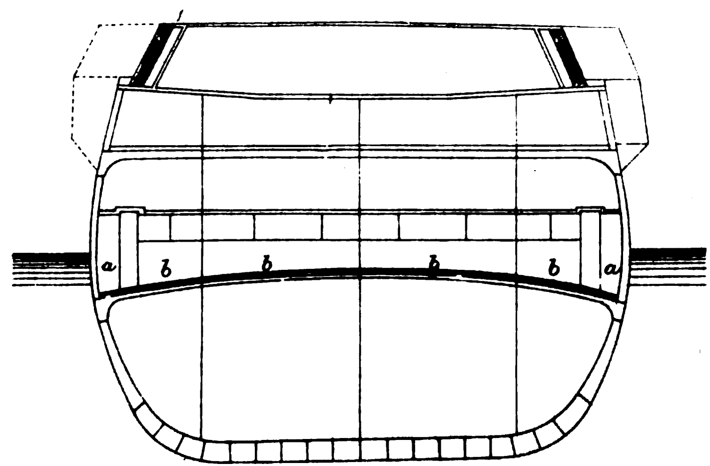
"Italia."

Main Deck.





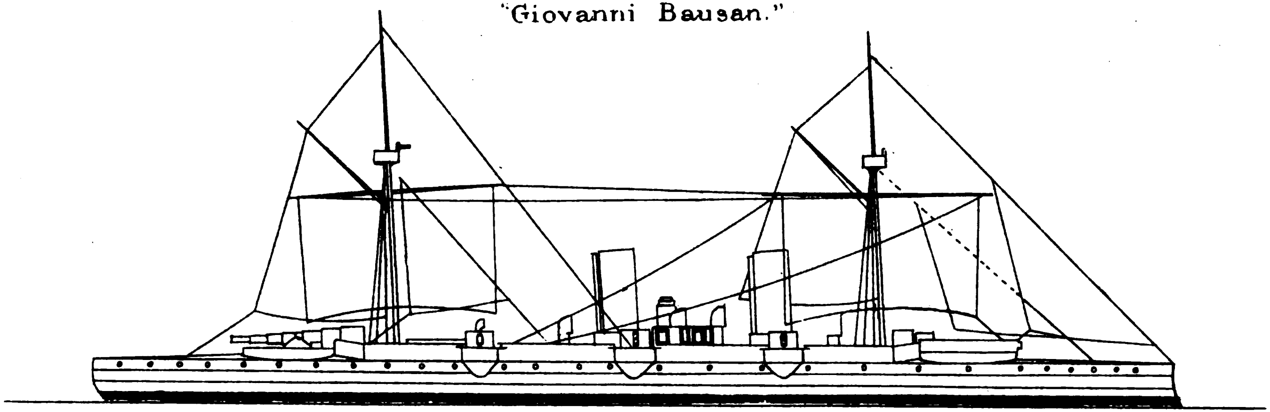
Section.

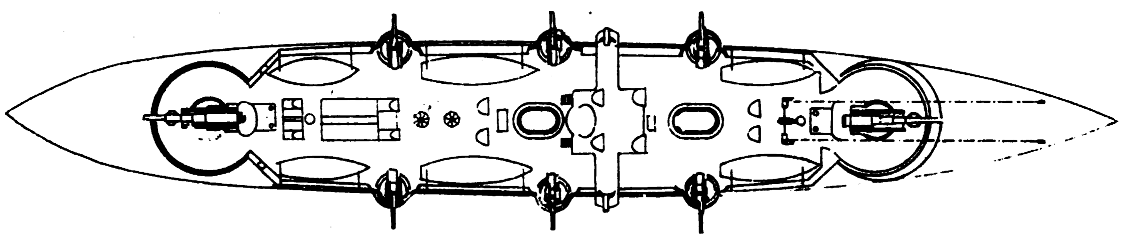


Pl. 75

ITALIAN SHIPS.

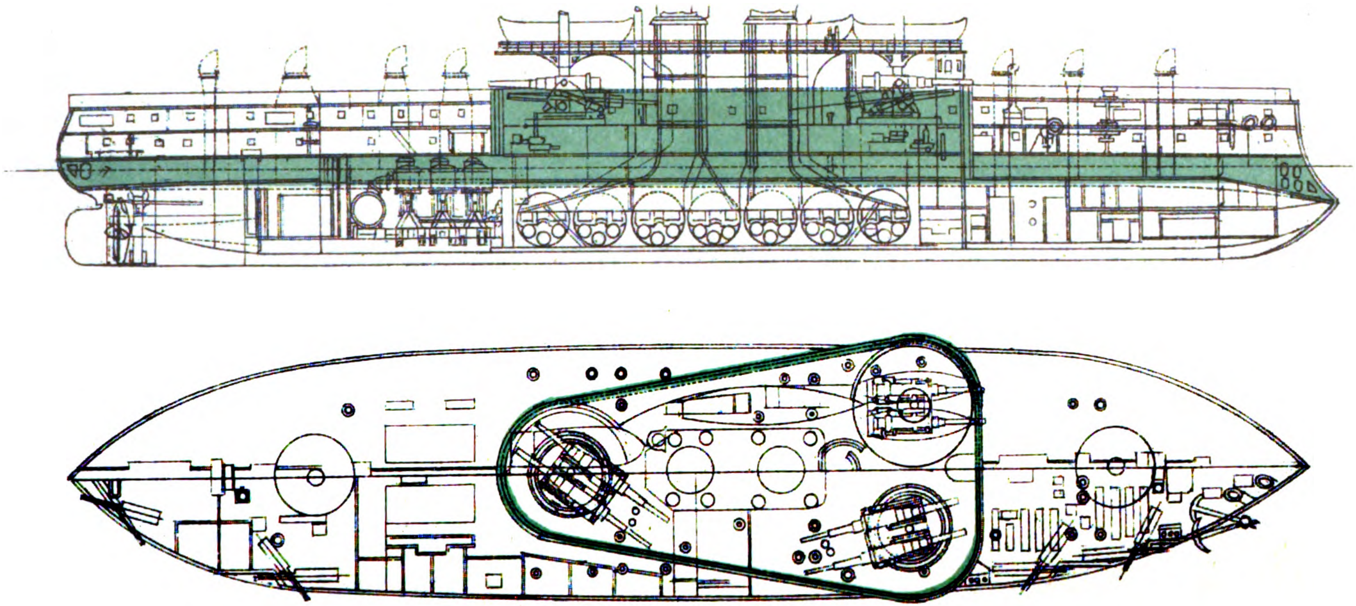
"Giovanni Bausan."





MANHART, LITH.

RUSSIAN SHIPS.

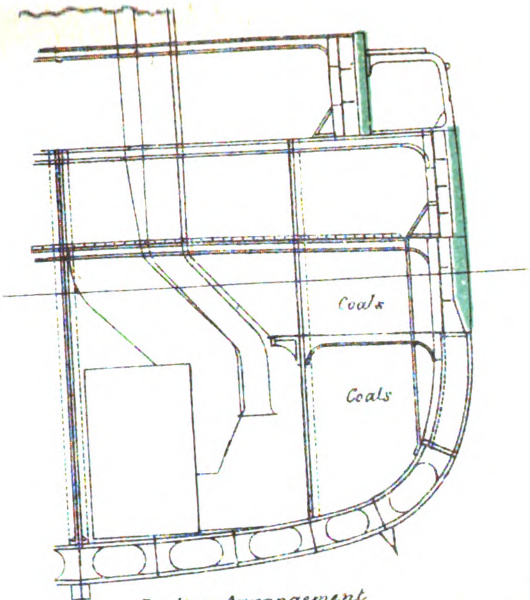


"Catherine II."
"Tchesme."
"Sinope."

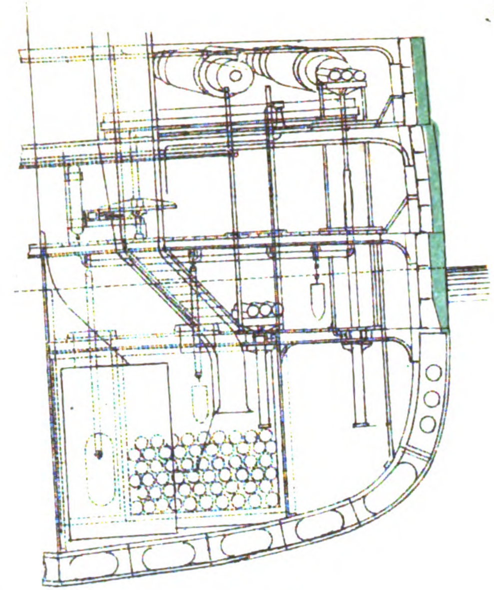
"Sinope"
"Catherine II."

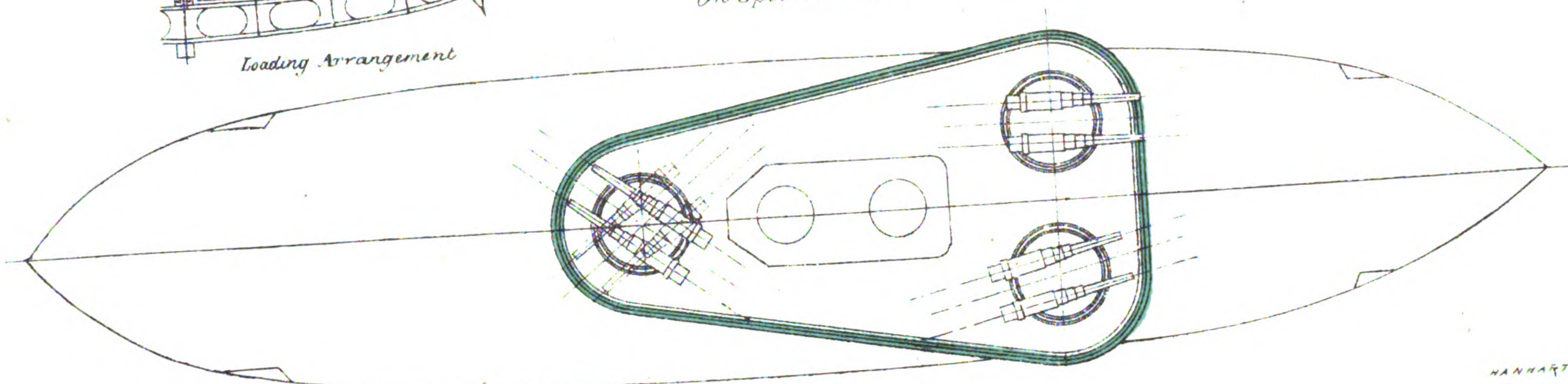
RUSSIAN SHIPS

On Special Scale



Loading Arrangement



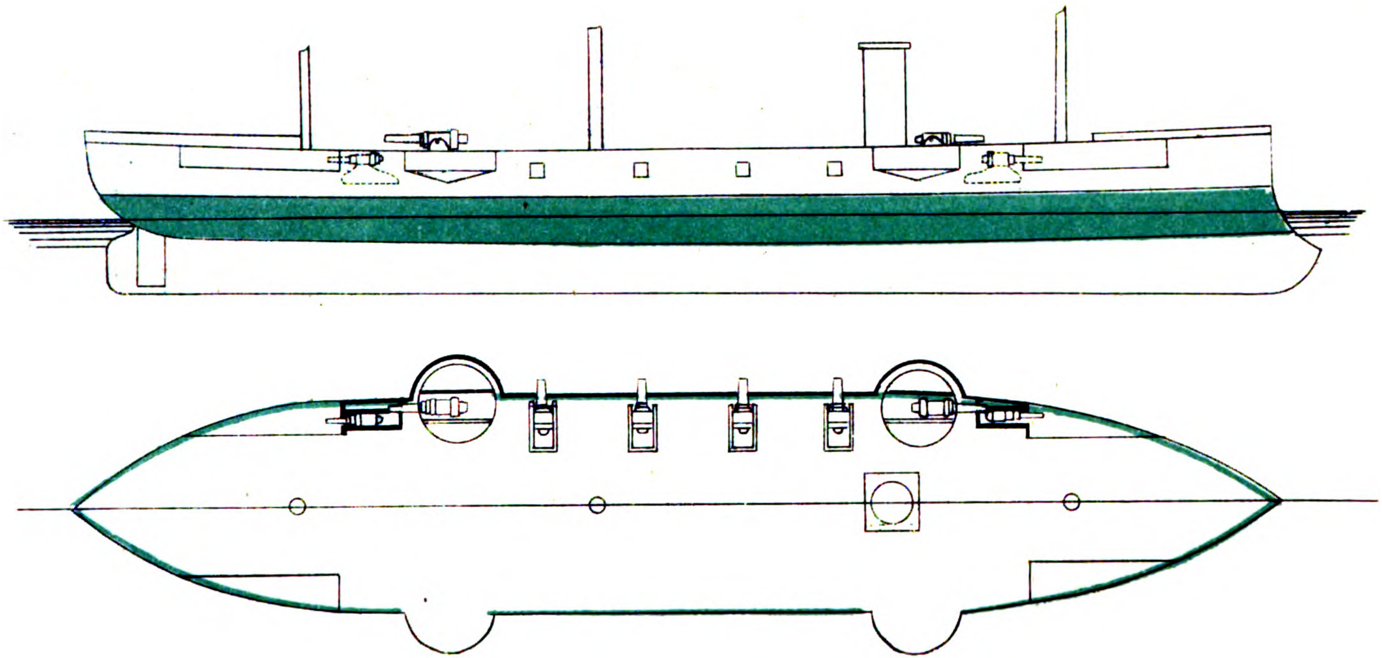


"Catherine II."

HANHART LITH

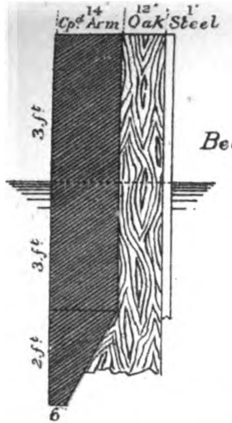
RUSSIAN SHIPS

"Minin"

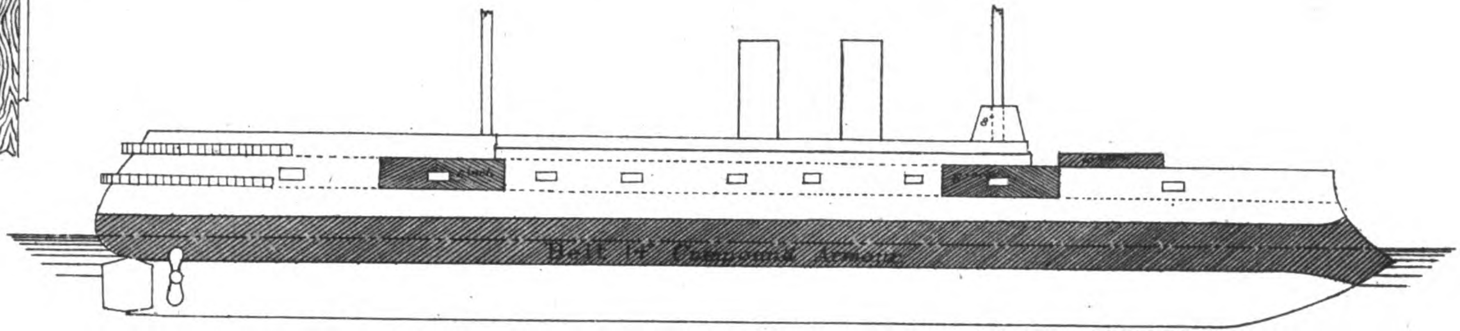


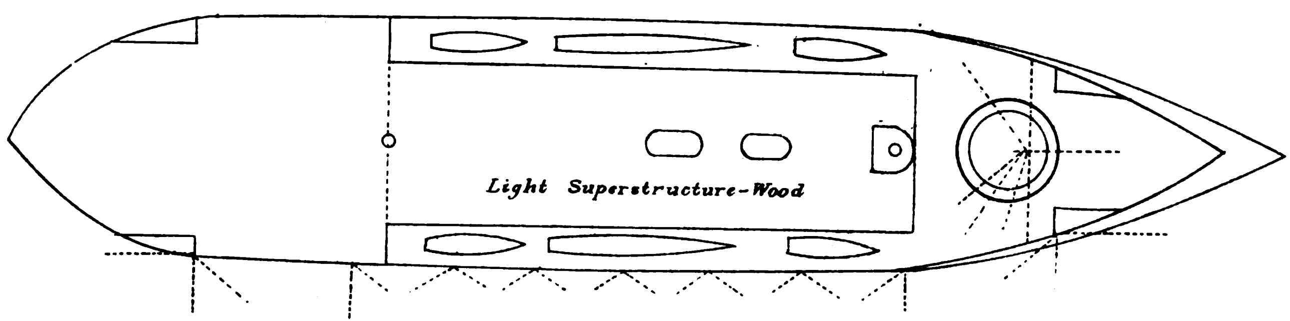
RUSSIAN SHIPS.

"Emperor Nicholas."
"Alexander II."



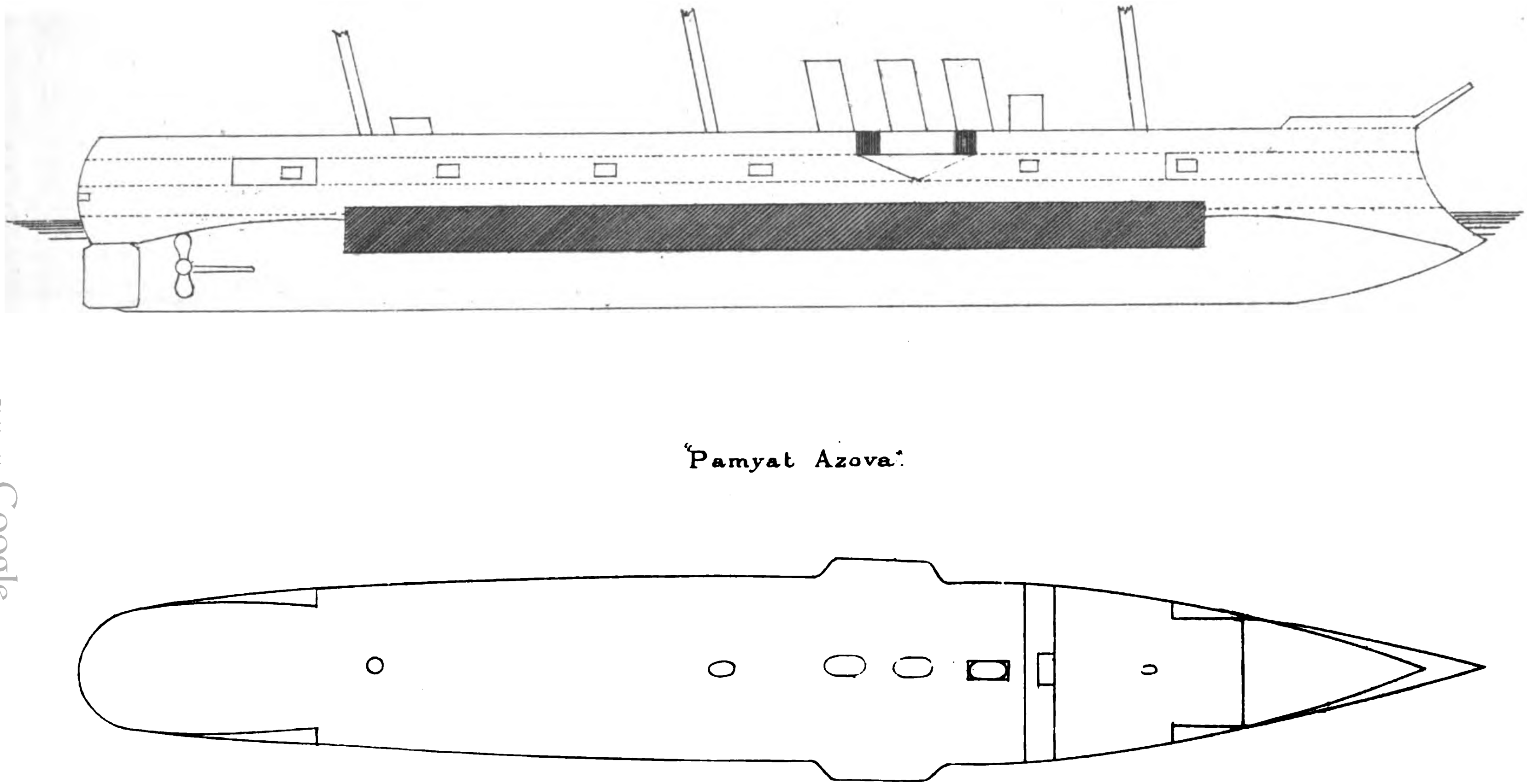
Belt
On Special Scale.





MANHART LITH.

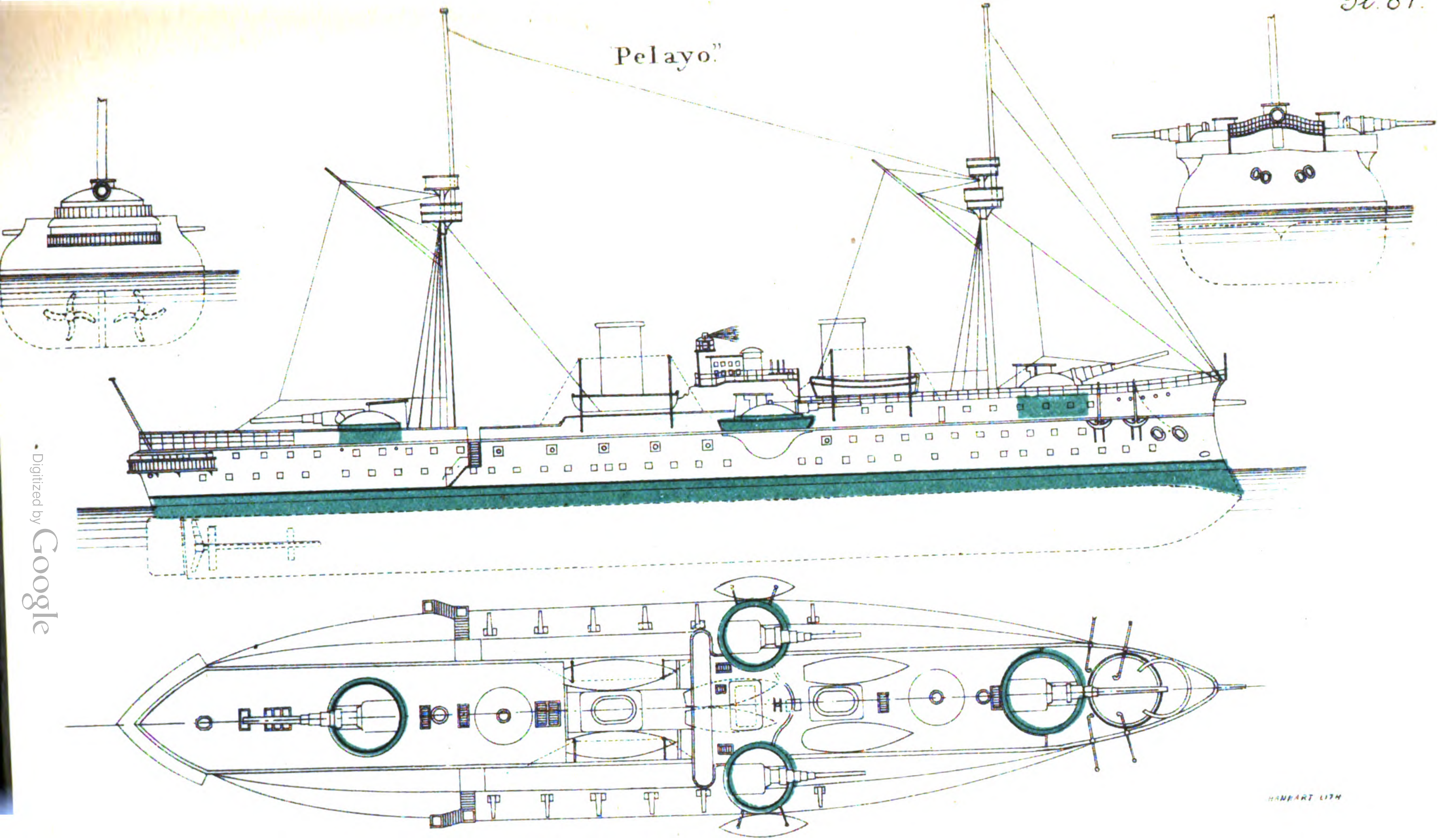
RUSSIAN SHIPS.



"Pamyat Azova."

Pl. 81.

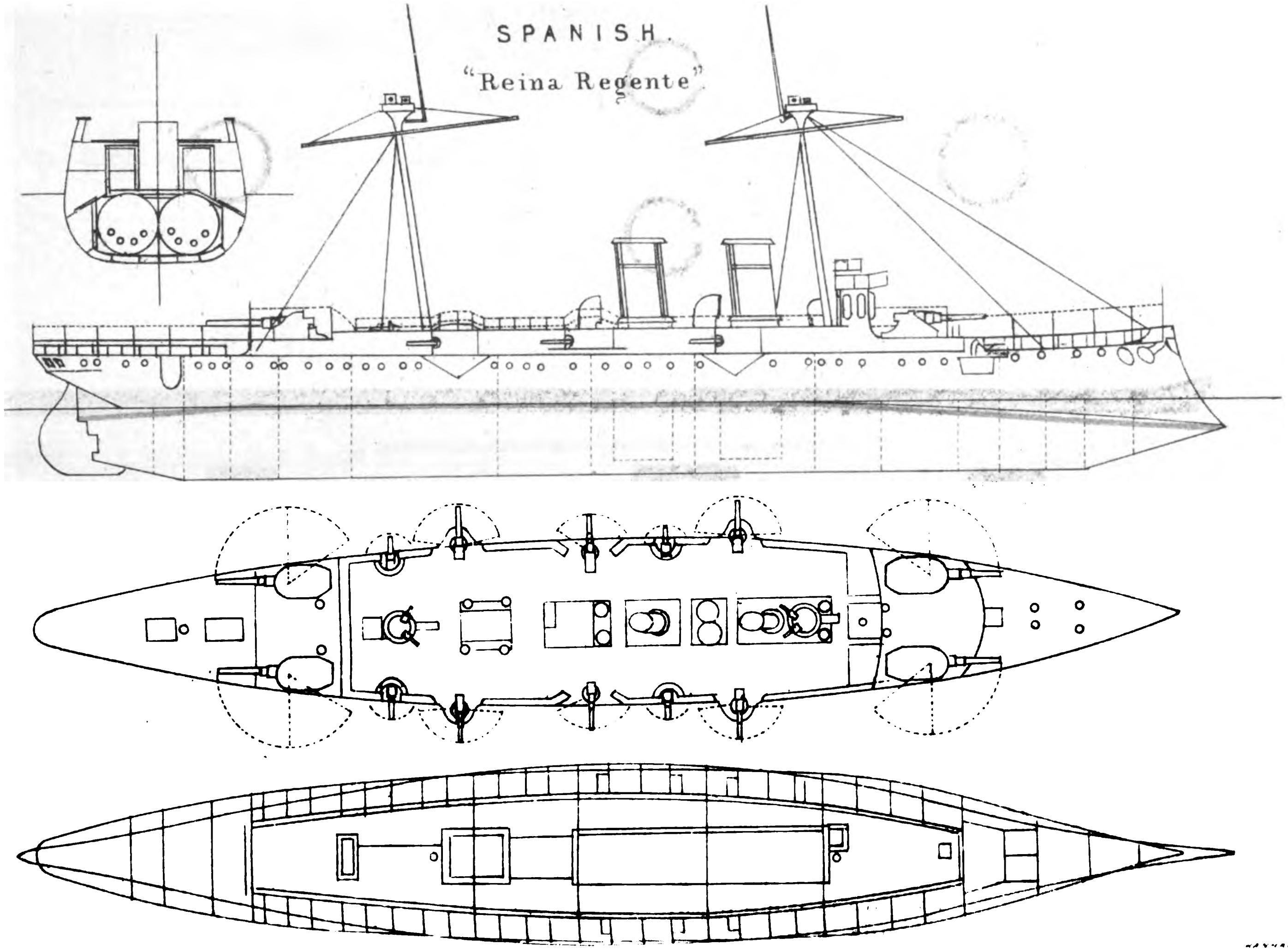
"Pelayo."



Pl 82.

SPANISH.

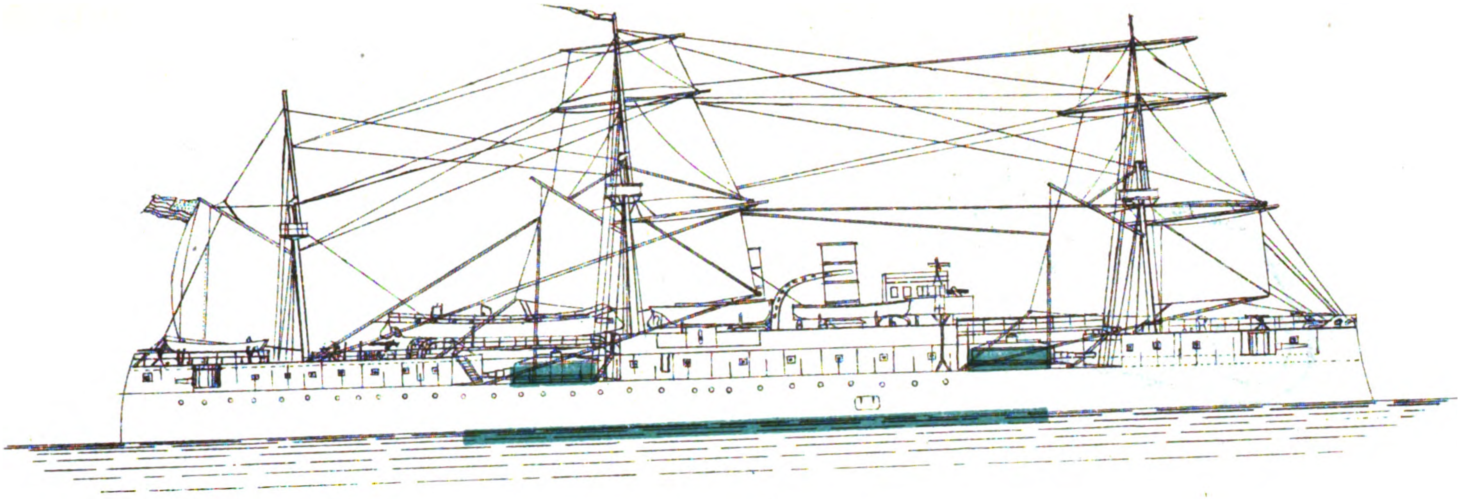
"Reina Regente"

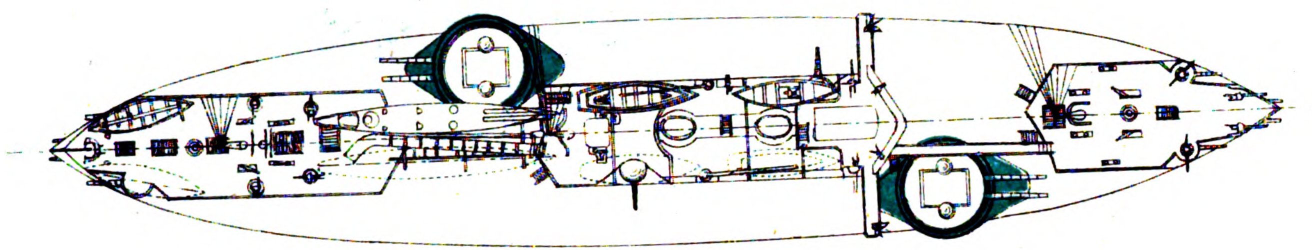


AMERICAN SHIPS.

Pl. 83.

Armoured Cruiser "Maine".

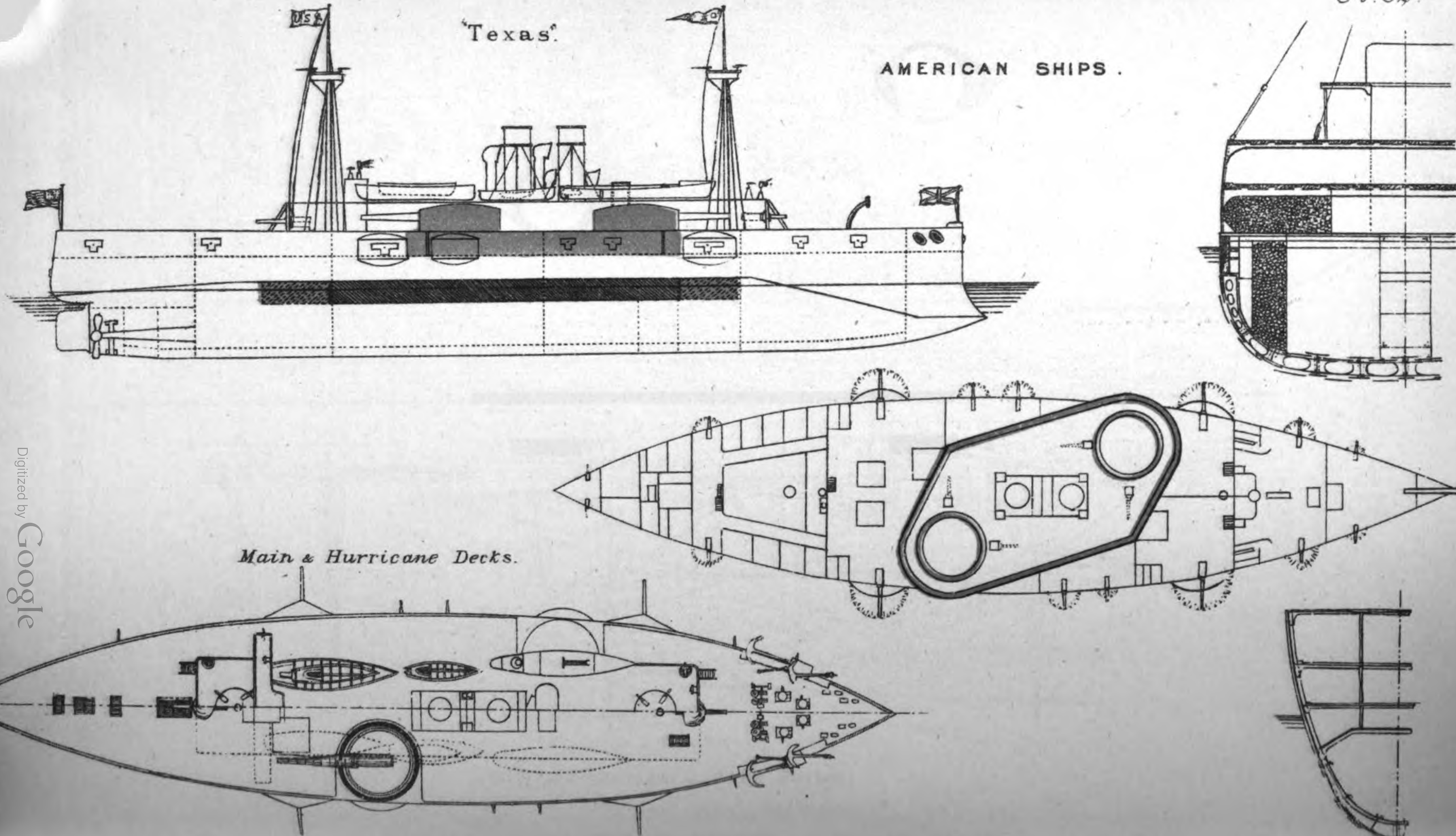




Main and Superstructure Decks.

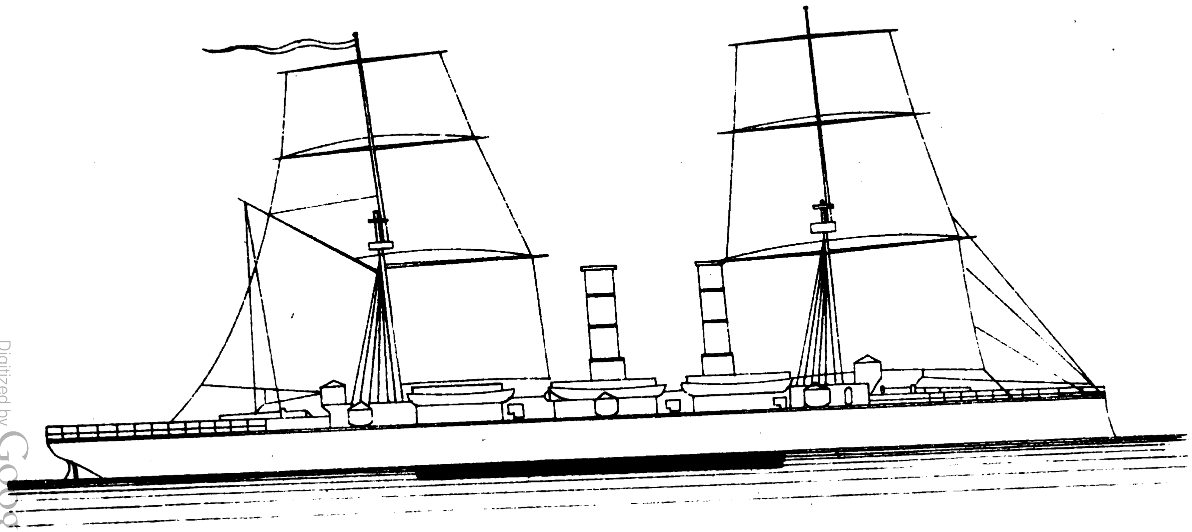
HANHART LITH

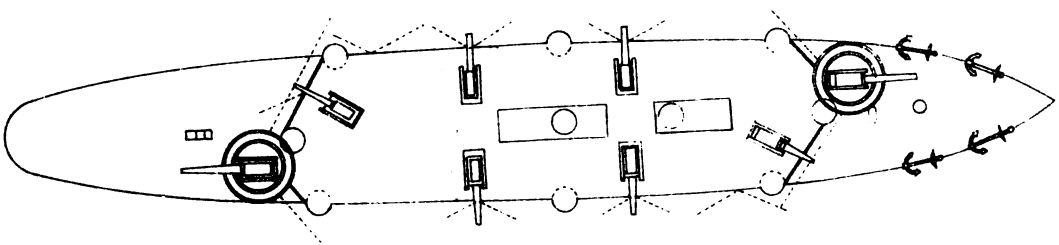
AMERICAN SHIPS.

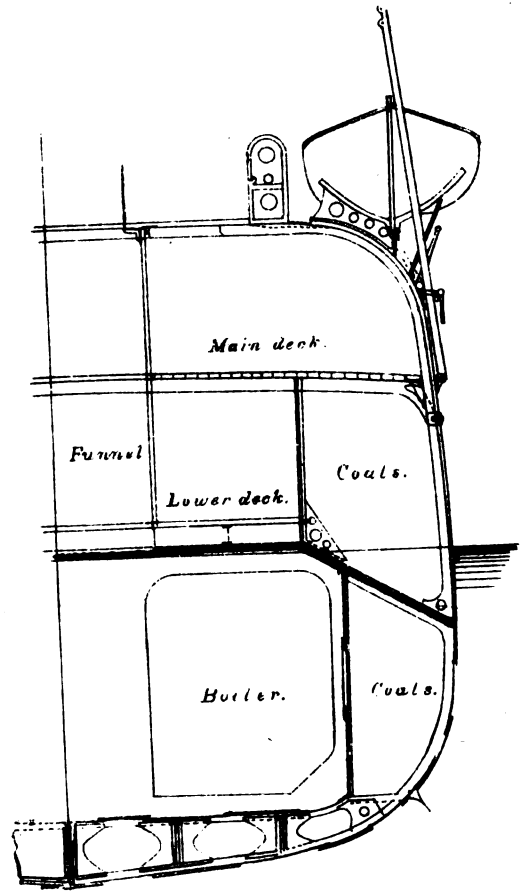


AMERICA—UNITED STATES SHIPS.

"Atlanta" & "Boston."

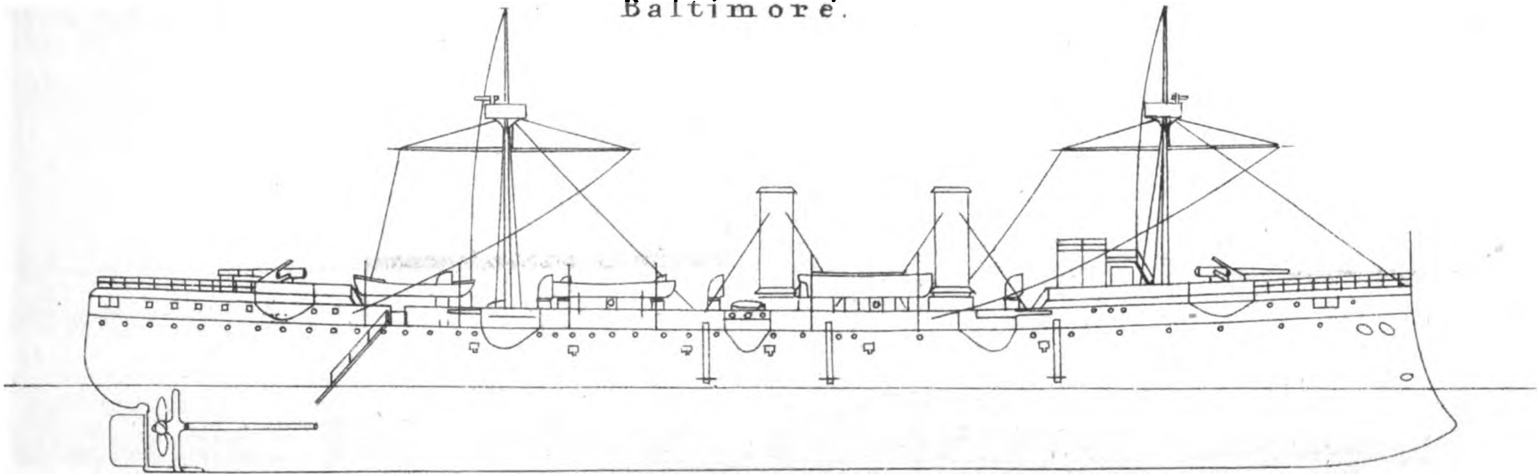


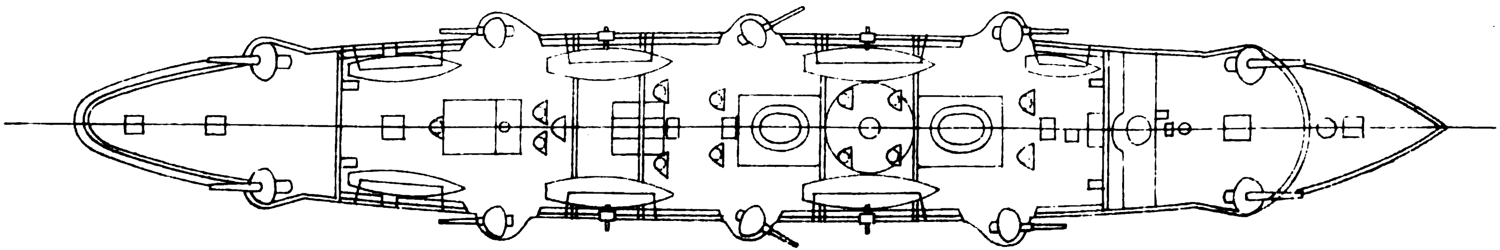




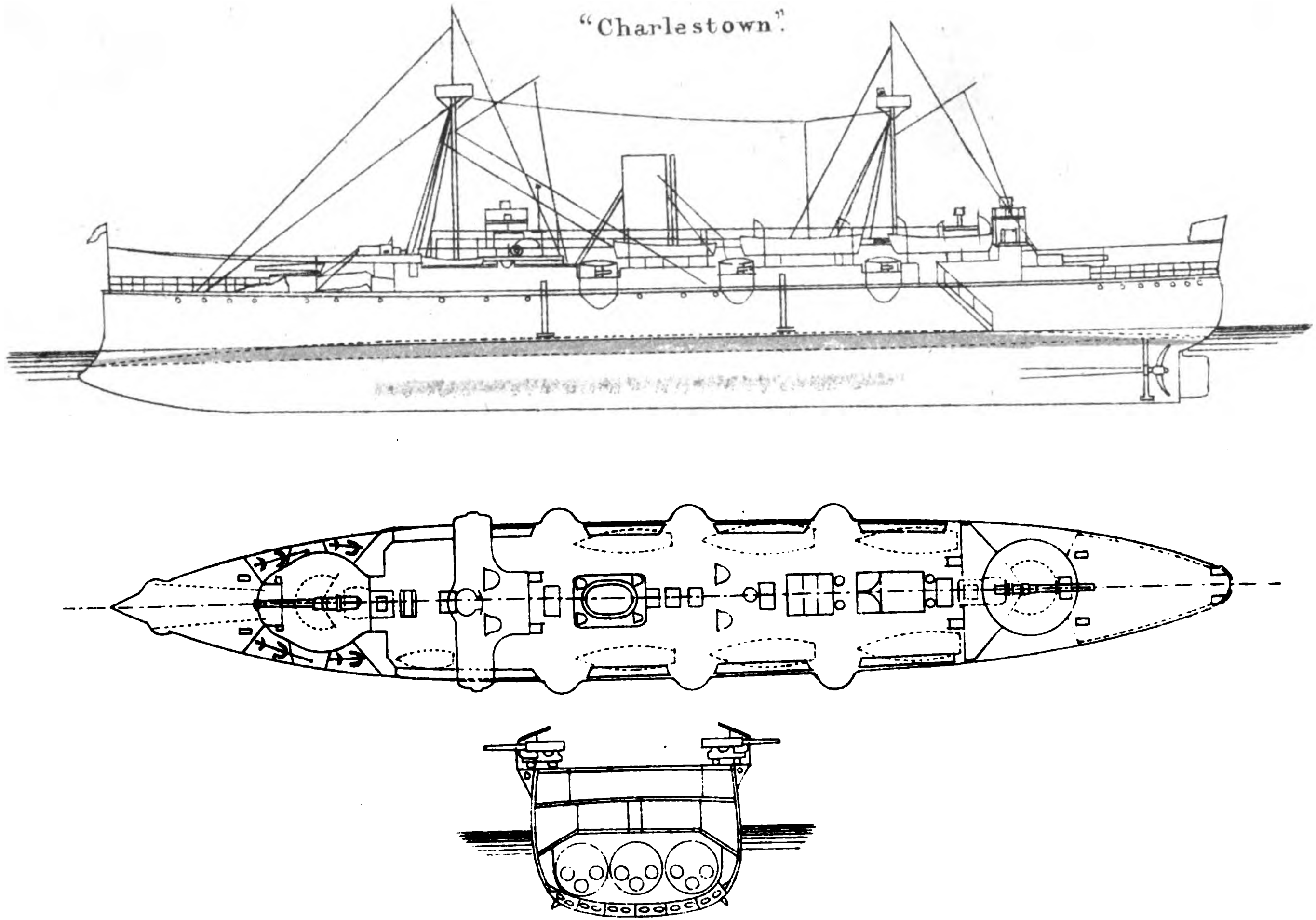
AMERICA-UNITED STATES SHIPS.

"Baltimore".





"Charlestown".

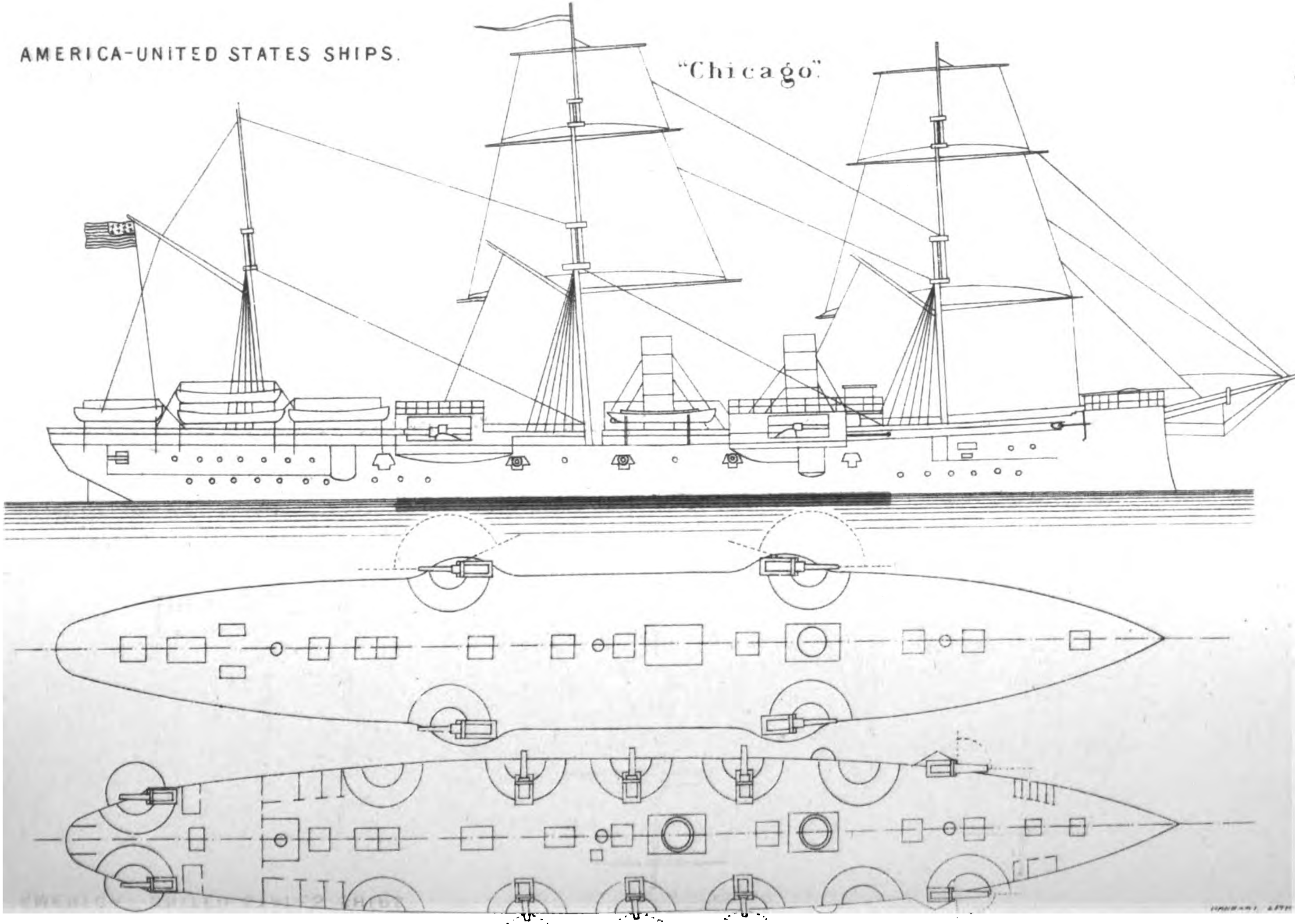


HANHART LITH.

AMERICA-UNITED STATES SHIPS.

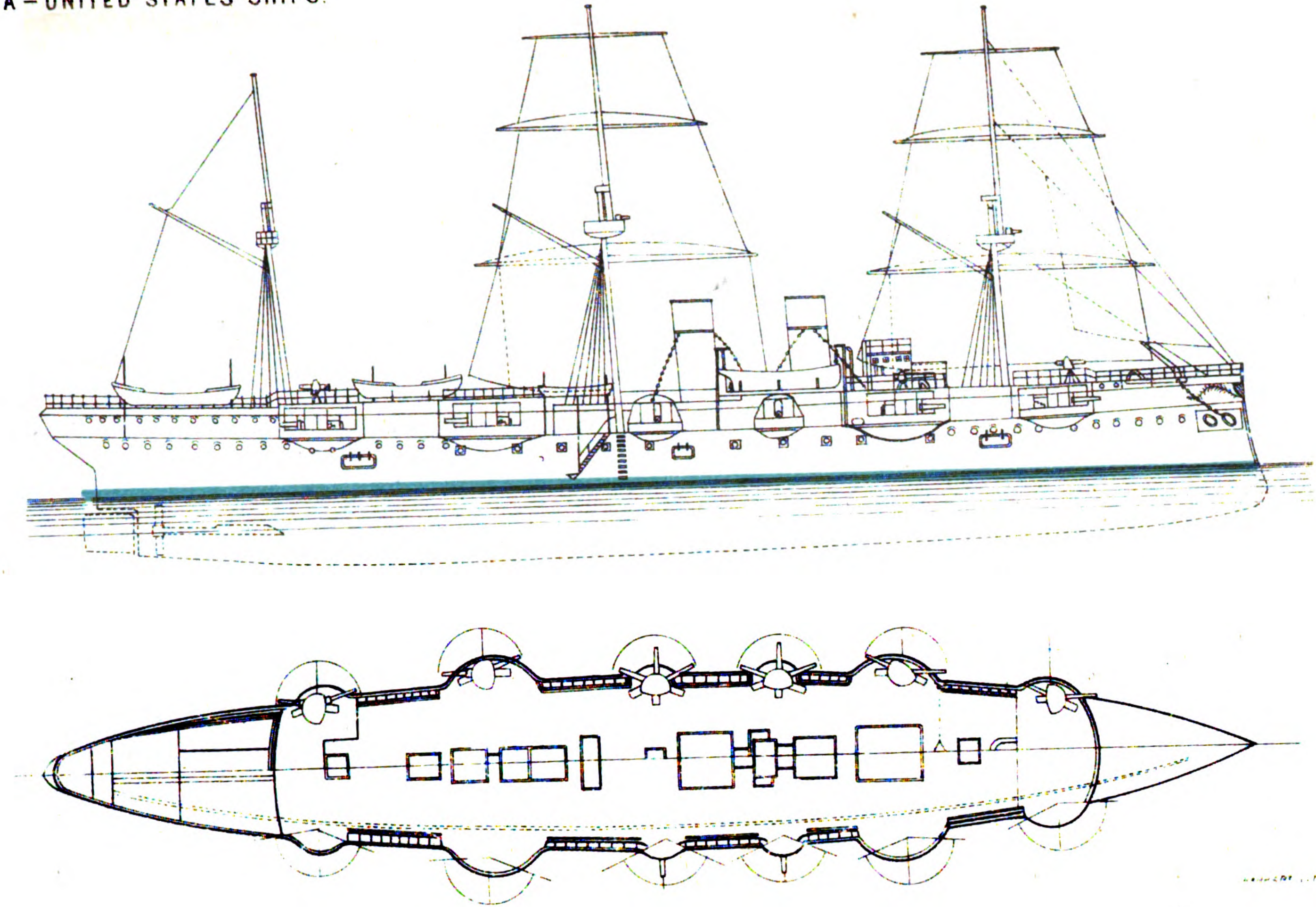
"Chicago".

Pl. 88.



AMERICA — UNITED STATES SHIPS.

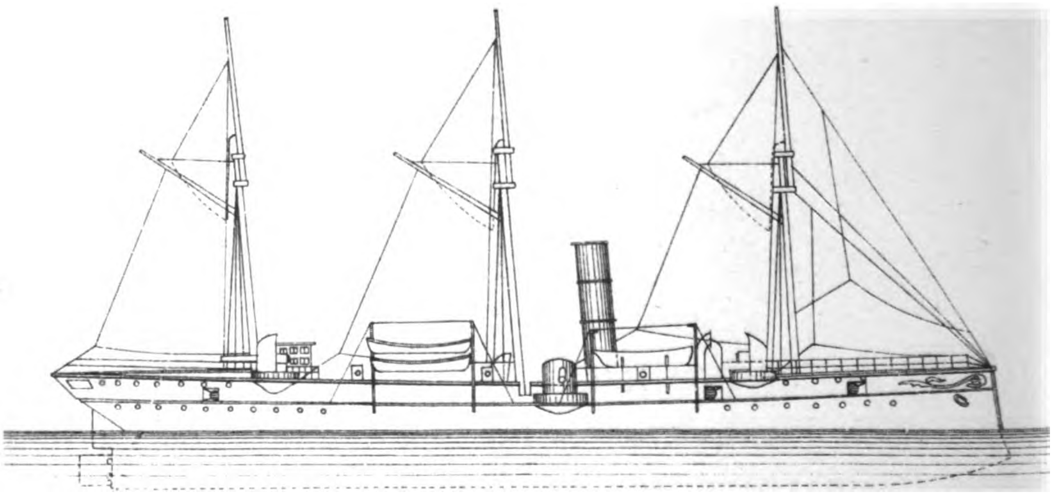
"Newark."



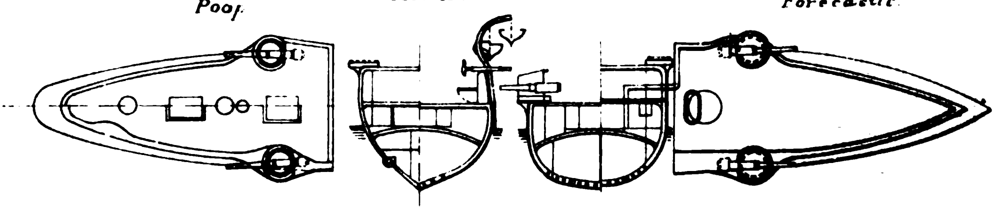
AMERICA – UNITED STATES SHIPS.

"York Town"

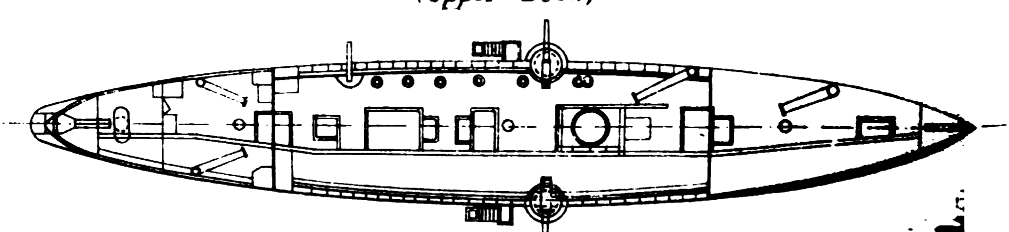
Torpedo Cruizer of 1700 Tons Displacement.



Poop. Sections Mid-Section. Forecastle.



(Upper Deck)



PART III.

ARMOUR AND ORDNANCE.

PART III.

Armour and Ordnance.

I.

Armour and Armour Experiments.*

Schneider on British armour.

A communication was made by M. Schneider to the *Engineer*,† published on July 12th, 1889. The writer complains that Sir N. Barnaby argued the superiority of steel-faced armour over Schneider's solid steel from results obtained in the Nettle series of trials, in which Schneider plates did not figure. Schneider's general position is well and reasonably expressed, and should be fairly weighed. It may be briefly stated as follows: "A compound or steel-faced plate has peculiar power to break up projectiles of medium quality, because the face is formed of extremely hard steel. Against such projectiles it acts to the greatest advantage. Projectiles are now, however, made—such as those of chrome steel—which are more than a match for the hard 'face plate.' Projectiles of large calibre may do the same without extraordinary excellence; and this face plate once overcome, the resistance of the soft back is small compared with that of solid steel." Schneider then gives a photograph of a trial which took place in June, 1880, against a sample plate for the Nordenskjold (*vide* Pl. I., fig. 1) which is without question an extraordinary success. The plate has not cracked, and it has stopped projectiles which were a full match for it in perforation, and the work per ton, 614 ft.-tons, is great. This, Schneider observes, was anterior to the Terrible plates made in 1881, when a new system came in. Schneider next gives the most unfortunate sample of Cammell's plates that perhaps has ever been published (Pl. II., fig. 2), and maintains that, while the compound plate attacked on board the Nettle was slightly superior to the English-made steel plate with which it is compared, it is by no

* *List of Authorities.—Engineer* for cuts and accounts of trials, *Le Génie Civil, U.S. Institute Naval Proceedings, Iron Age, Messrs. Cammell & Vickers*, &c.
† See *Engineer*, July 12, 1889, pp. 27, 30, and 31.

means a remarkable one, and that the steel plate is so soft that it is hardly better than wrought iron.* Finally, Schneider observes that a chilled projectile, whose calibre bears a large relation to the thickness of plate, will not break up against its steel face. A 16-cm. (6·3-in.) chilled shot will not break against a 10 or 12-cm. (3·9 or 4·7-in.) plate, and chrome-steel shell of all calibres hold together. Hence the French Navy have adopted the latter exclusively for proof of solid steel plates. Schneider's reasoning is powerful and fair, and he supports what he urges by facts and figures.

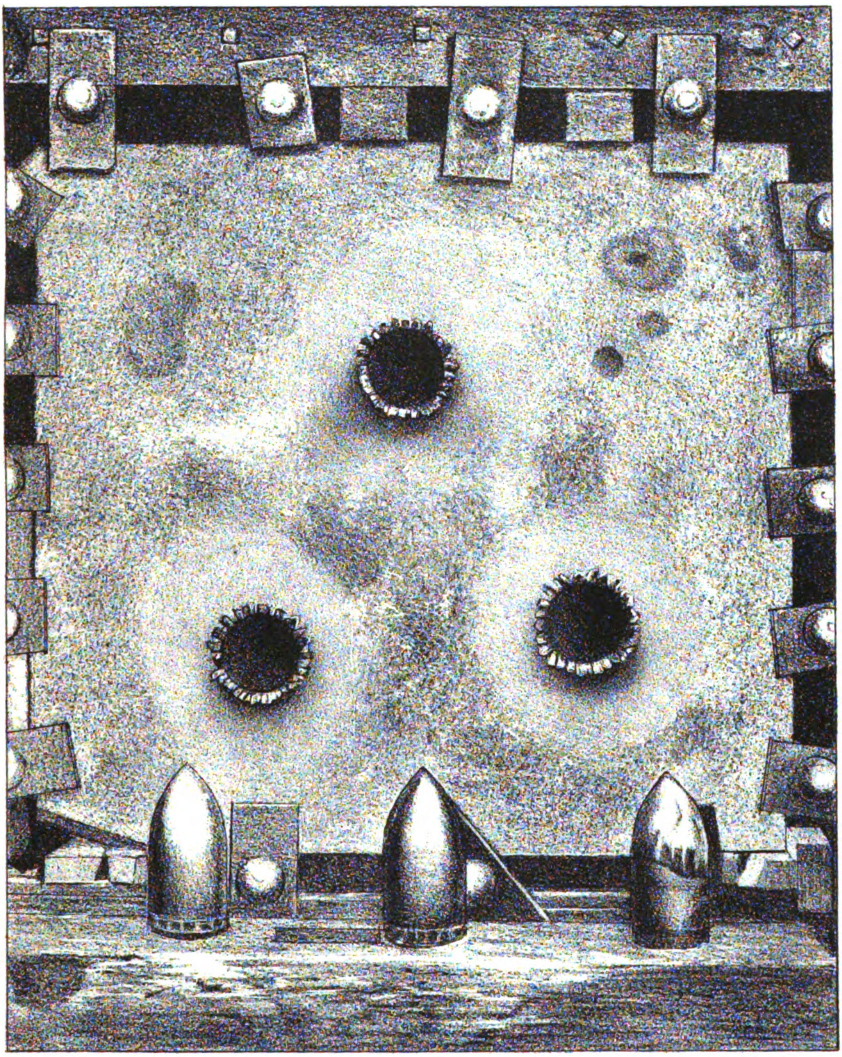
This tone may well set an example to writers on similar questions, and part of what he says is new and specially valuable. The following answer, however, might be made.

Answer to M. Schneider.

It is true that compound plates have depended on their steel face to break up projectiles and mainly resist their entrance, and their backs have been soft in order to hold the plate together. This, however, is not a necessity inherent to the compound principle, but enforced by our authorities at the Admiralty. By them from the beginning "through cracks" were not tolerated, and experience has shown that whatever power of extension metal in a plate back might have, it would only exercise it under the impact of shot, if its tenacity was low; otherwise it would break through in preference to stretching. This has shaped the whole of British compound armour, and not unnaturally that made abroad on the same system. Repeated experiments have been made with "foundations" or backs of soft steel or wrought iron in which high tenacity and high elongation were combined; but in spite of the good resistance offered, the tendency to "through cracking" was held to be a reason for condemning the plate. For some time past it has been urged in this country that, in order to keep out superior projectiles now made, increased hardness and "bone" in the plate ought to be given even at the expense of increased liability to through cracks, and that with our cruisers, at all events, harder armour should be used, more particularly since the feasibility of driving shells carrying high explosives into the interior of a ship becomes a contingency to be considered. Much might be done to hold fractured plates up by bolting. There is nothing in Schneider's arguments against the compound principle in the abstract, except the notable objection that the face-plate becomes detached from the "foundation," as in the very unfortunate samples exhibited by him. A most

* M. Schneider here publishes figures and details which have been hitherto treated as strictly confidential in this country. Some of these results were published in America; but M. Schneider's knowledge is not confined to these.

ARMOUR PLATE FOR THE NORDENSKJOLD.
SCHNEIDER-SOLID-STEEL.



PHOTOGRAPH-SENT BY SCHNEIDER TO ENGINEER.

Fig. I.

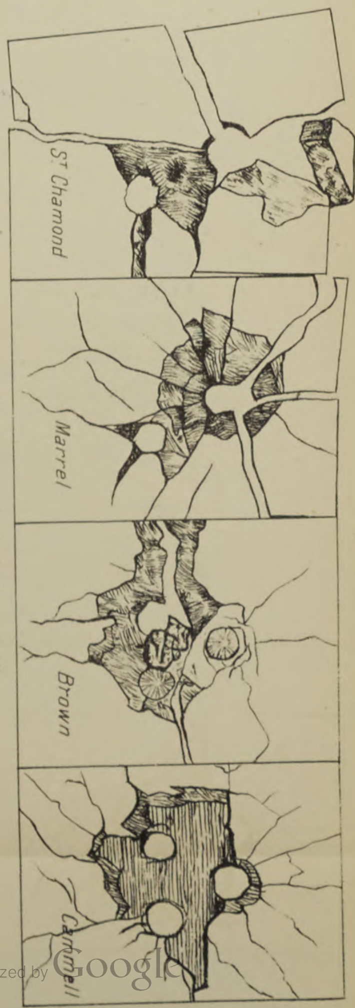
CAMMELL-STEEL-FACED-9IN-PLATE
AFTER-ATTACK-BY-KRUPP-6IN-STEEL-PROJECTILES.

Fig 2

PHOTOGRAPH-SENT-BY-SCHNEIDER.

Fig. 3.

KRUPP 6IN. STEEL SHOT, AFTER ROUNDS 2514 & 2515
AT CAMMELL-PLATE.



After rounds 7.8.9. and 10.

Fig. 4.

serious objection this would be, were not such behaviour so exceptional that 'in all the series of broken plates at Shoeburyness it may be questioned if anything like it could be found. It may be difficult, no doubt, to persuade those who have no experience in such trials, that Cammell has been so unfortunate as to suffer from so exceptional an example falling into his rival's hands. Those who have experience, however, know that the union of face and back is almost invariably so perfect that very little weight can be given to such an isolated example out of the hundreds of samples attacked. Schneider might equally object to an adverse critic urging the evil of spontaneous fracture, which has occasionally occurred in solid steel plates, for more than it is worth.

Taking things as they are, however, it must be frankly admitted that the Nordenskjold plate is an admirable one;* but it may naturally be asked why so old an example is taken, if it has been equalled or surpassed since? Projectiles have not stood still since 1880; nay, it would generally be admitted that more marked improvement has been made in them than in plates. Schneider says that the French have wholly adopted chrome-steel projectiles for proof of plates; surely he might furnish a sample obtained in some single instance. He considers Cammell's steel plate little better than wrought iron. He was invited to compete; why does he not give his reasons for not doing so? Either Schneider or the Admiralty put difficulties in the way of this most desirable object—which was it? Far from supplying examples of the behaviour of solid steel plates under the attack of forged steel projectiles, Schneider makes much of the "Gota"-Schneider plate (shown on p. 360, *Naval Annual* of 1888–89). This success was by no means extraordinary, for it is so qualified by the fact that chilled iron shot were used as to be of little value. In the face of complaints that samples of the Schneider plates successes have been are given under the attack of chilled projectiles only,† Schneider states that it has been decided in France to employ only chrome-steel projectiles in plate proof, but goes back to 1880 to give an example.

Lastly, for compound plate remains the great fact that the hard face tells much more in its favour when attacked at an angle. It has been preferred to solid steel in French land cupola roofs, probably for this reason chiefly. On the other hand, the Bethlehem Iron and Steel

* The writer makes it work out a more remarkable plate than shown by Schneider himself.

† The Terrible plates and that for the Amiral Baudin, which was specially selected by Lieut. Jacques in his advocacy of solid steel, were attacked by chilled projectiles only.

Works in Pennsylvania, under the guidance of Lieut. Jacques, late of the U. S. Navy, have opened their large works for the manufacture of solid steel armour, and have large orders for the U. S. Navy.

French opinions on armour.

The prevailing opinion in France, it is said, generally agrees with that expressed by Schneider.* Armour is tested in France without backing, supported by a plate resting longitudinally in T or L fashion against each end. Cast-steel plates tempered in lead are spoken of hopefully. Some consider them equal to hammered steel. The Compagnie du Chatillon and Commentry make these as well as compound plates. †

Nettle trials of 1888.

The Admiralty have not allowed any general review to be published of the results obtained in the Nettle trial, such as involved comparisons being drawn between all the plates of makers who submitted them. No objection was, however, made to manufacturers exhibiting photographs of their own plates at the Institution of Civil Engineers. Thus it becomes possible to record results which may naturally be assumed to be some of the best. The elements of the trial of each plate were the same. The plates were 8 ft. × 6 ft. × 10·5 in., weighing from about 9 tons 7 cwt. to 9 tons 9 cwt. They were attacked by a 6-inch gun, firing 3 forged steel projectiles and 2 of chilled iron, the weight of each being 100 lbs., the striking velocity was 1976 feet, the energy 2708 foot-tons, and the calculated perforation 12·6 inches of wrought-iron, or 10·0 inches of steel or steel-faced armour. The shock per ton of the five rounds was about 1440 foot-tons. The order of firing was—No. 1 to the firer's right-hand bottom-corner; No. 2, left top, both with steel projectiles; No. 3, right top; No. 4, left-bottom, both chilled iron; No. 5, to the centre with a steel projectile. Pls. III. and IV. show Cammell's best steel and steel-faced plate, and Pl. V. shows Vicker's steel plate. No comments are purposely expressed, the drawings being left to speak for themselves, but it will be seen from the calculated perforation above that all the plates are good, five rounds having been borne well.

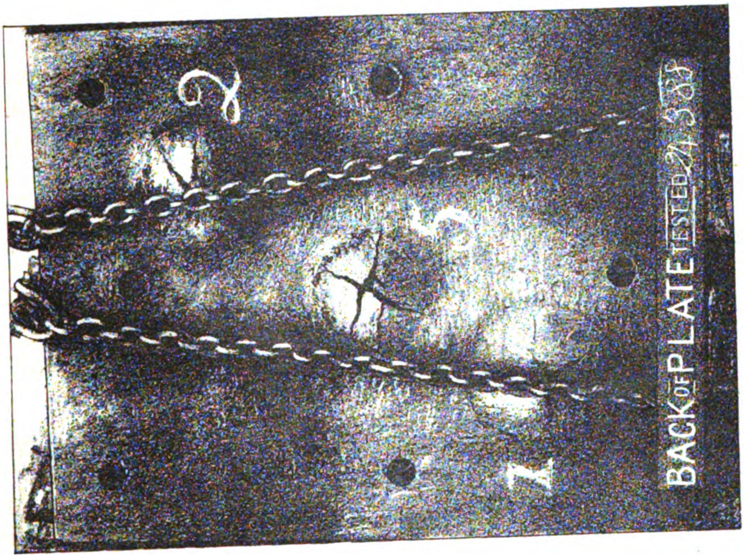
Dutch competitive trials.

In November, 1889, competitive trials of compound plates ‡ made by Cammell, Brown, St. Chamond, and Marrell took place off Helder, North Holland. The plates were 9 ft. by 6 ft. $11\frac{1}{16}$ in. by $11\frac{1}{32}$ in. thick. The gun was a Krupp, 28-c.m. (11-inch), 28-ton gun firing a Krupp-forged steel projectile weighing 252·2 kg. (556 lbs.) with a

* Nevertheless compound plates are being made for France in large quantities, being ordered recently for the belt of the Brennus and for the Bouvines.

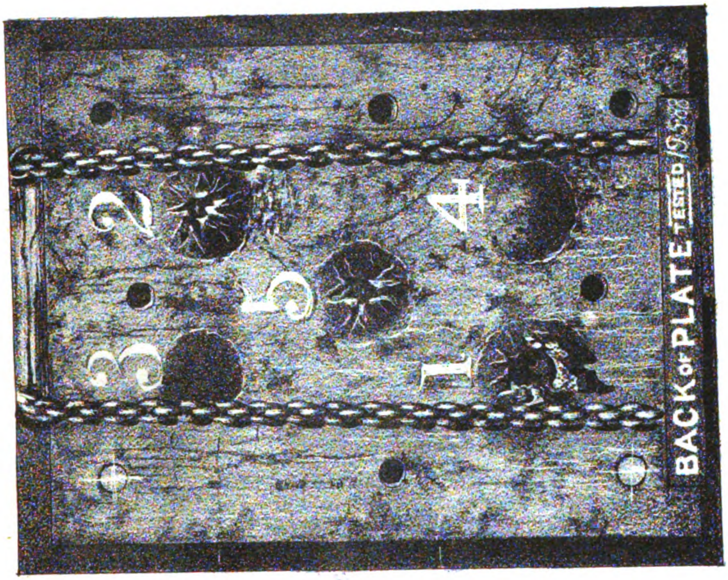
† See *Naval Annual*, 1888–89, p. 363.

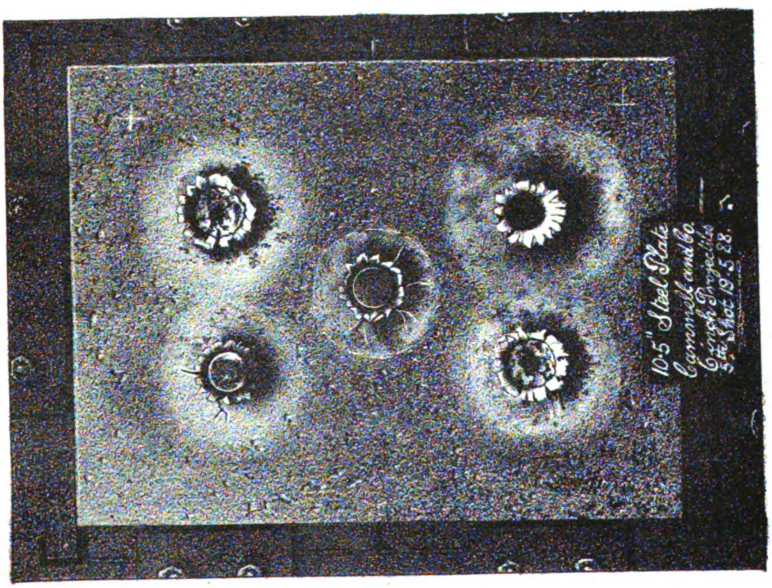
‡ See *Engineer*, November 22, 1889, p. 438, for more full account.



HANHART LITH.

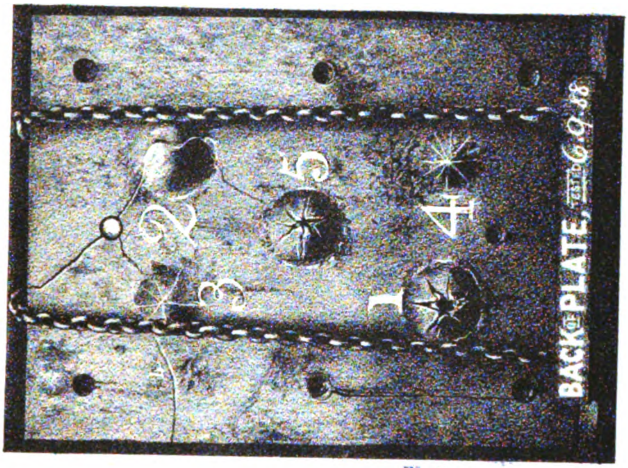
Pl. IV.

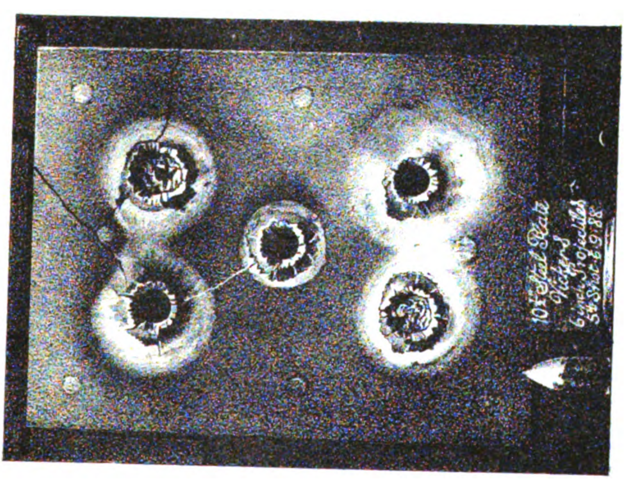




HANHART LITH.

Pl. V.





HANHART LITH.

striking velocity of 409·7 m. 1355 feet). The energy of each round was 7078·8 foot-tons—perforation 14·52 iron or 12·1-in. steel or compound metal, 367·12 foot-tons energy per ton of plate. Three rounds were to be fired at each plate. Fig. 4, Pl. II., shows the condition of the plates—the Brown and Cammell after receiving three blows, the French plates two blows each, the latter being too far injured to make a third blow desirable. The most notable feature of this trial is the fact that on Brown's plate *two Krupp's projectiles broke up like chilled iron,* of which more hereafter. This plate in fact stopped both these rounds; thus, though there was more fracture than in the Cammell plate, it must be pronounced the best. Here, again, it is greatly to be regretted that steel armour was unrepresented.

Trial of a Redemann Tilford plate.

The results of a trial of a steel plate made on the Redemann-Tilford's process, which took place in the Royal Navy Yard at Washington, on December 10th, 1889, have recently come to this country. This result, as reported, is so remarkable that it is most desirable to obtain photographs, and above all to repeat it if possible. The figures published in the *Iron Age* of January 16th, 1890, are as follows:—The plate was 30 in. × 30 in. × 6 in., and weighed 1500 lbs. It was attacked by a St. Chamond forged steel 6-in. projectile weighing 100 lbs. The firing charge was 49 lbs., the striking velocity 2103 feet per second. This gives a striking energy of 3066 ft.-tons, and a perforation of 13·4-in. of wrought-iron, or 10·7-in. of steel, and the extraordinary figure of 4578 foot-tons per ton of plate. A plate so fired at, ought, on any known system of calculation, to have been utterly destroyed. It is stated, however, that the projectile perforated less than three inches, and broke up like a chilled shot. This is a single result, but it is too remarkable to be ignored. It only appears to admit of three possible explanations: first, the statement might be wholly untrue; second, the projectile might have been a bad one, or it did not perhaps strike point first; third, the plate possessed extraordinary resisting power.

There is reason, on inquiry, to believe that the statement is not untrue. The projectile is stated to have been costly and carefully selected. It is perhaps more likely that the blow was in some way a foul one, than that the projectile was bad; moreover, extreme badness only could account for the survival of the plate. A photograph might tell much as to the blow. The last alternative suggested, namely, that of the plate possessing extraordinary powers, then deserves consideration. It may be seen that two forged steel projectiles broke on Brown's plate in the Dutch trial mentioned above. These projectiles

were rather more than a match for the plate. That two should behave like chilled shot when fired against this plate, while all those fired against other plates held together, appears to suggest special resisting powers in the Brown plate's steel face, and if a steel face can be made thus to fracture a forged steel projectile, before it delivers all its energy on the point of impact, it is conceivable that the principle might be pushed further. The plate might thus be saved even from a blow far outmatching it by breaking up the shot before enough energy was delivered to destroy it. In the Redemann-Tilford process the front of the plate is said to be rendered hard in an extraordinary degree by both chemical and physical treatment. Whether by this or other means a plate face may in the future be rendered so hard as to break up forged steel as at present made, further experiment must show.

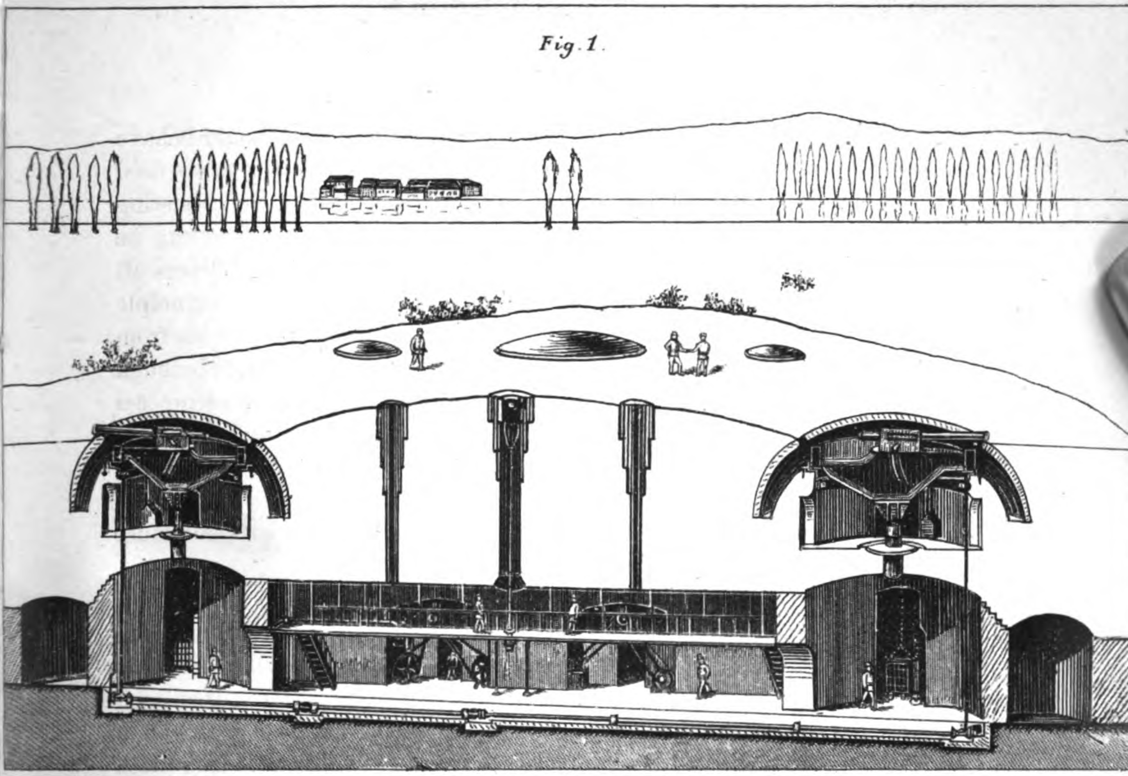
Melinite shell attack.

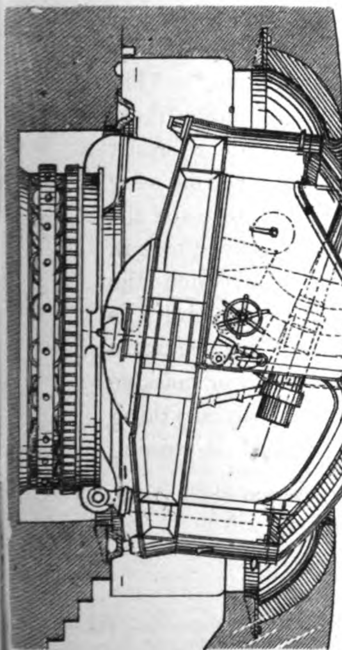
The question of the attack of ships by means of shells carrying high explosives must be carefully kept in view. Since the *Resistance* trials, little has been said on this subject, but it is believed that such experiments as have been made have rather tended to decrease than increase apprehension on this head. Some interesting trials took place at Chalons in connection with a very ingenious oscillating turret designed by Mougin, in which the port is brought into action or "eclipsed" by oscillation, as shown in Pl. VI., figs. 2 and 3. Some Malmaison experiments had disheartened French engineers as to the power of resisting the attack of melinite shells by means of old type defences. It has since been found that, on a system proposed by Mougin, in which cupolas are combined with concrete in the form of what is termed an artificial rock of concrete, the attacks of melinite shells may be defied successfully. Fig. 1, Pl. VI., shows this system.* This, doubtless, does not directly concern ships, whose attack is more likely to be against Gruson chilled iron cupolas and forts made to resist the comparatively few rounds which a fleet may deliver from very heavy ordnance. This Mougin fort is obviously designed to resist the continued systematic attack of medium guns, such as takes place in land siege operations. Nevertheless, the principle on which the action of high explosives is met might be applied to coasts, and it is important to learn what is known on the matter. With regard to ships or forts it remains to be shown that massive armour or massive concrete can be shivered, as has been imagined by some, by anything like detonation against the surface. The danger of a shell passing

* For full description see *Le Génie Civil*, and *Engineer*, November 29, 1889, p. 449.

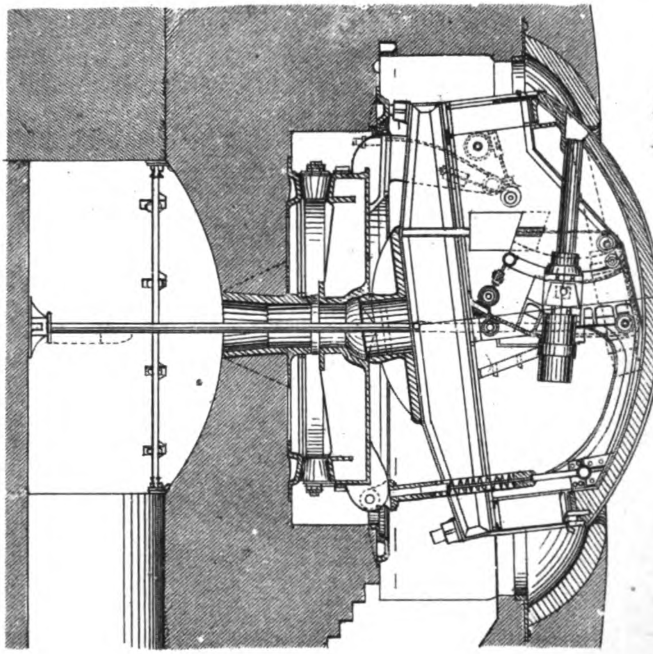
MOUGIN-CUPOLAS IN ARTIFICIAL ROCK.

Fig. 1.





FIRING POSITION ELEVATION & SECTION THROUGH PART.
Fig. 3



MOUGIN-CUPOLA POSITION OF ECLIPSE SECTION THROUGH PART.
Fig. 2.

intact through armour and bursting under the action of a bursting charge, composed of melinite, bellite, roburite, or other high explosive, is a more serious one. Without question this is becoming a possible contingency in direct fire against wrought iron. The inclination of the ship's armour and the employment of hard-faced plates very greatly decrease the chances of success. It is a great protection to a ship to be able to engage a fort with her guns firing at a considerable angle to her sides. Nevertheless, the danger is one to be provided against as far as possible. With this in view, the employment of harder plates for the comparatively thin armour of cruisers seems desirable, as before mentioned (see p. 352).

Rule of thumb as to firing at armour.

The following *rule of thumb* admits of proof on certain assumptions, and may be found useful.*

Take the calibre of the gun as a measure of the armour, and it will be found that no shot can perforate a plate unless it has over 1000 ft. velocity for each calibre in the thickness. Thus an 8-in. projectile must have over 1000 ft. striking velocity to perforate an 8-in. plate. It must have over 1500 ft. velocity for a 12-in. plate, over 2000 for a 16-in. plate, and so proportionally.

For many new-type guns firing projectiles heavy in proportion to their calibre, the direct perforation is very close to one calibre for every 1000 ft. striking velocity.

Oblique fire.

In *oblique fire* the perforation is found by multiplying the direct perforation into the sine of the angle made by the axis of the shot with the face of the plate, unless this angle becomes too oblique for the shot to bite, which will generally be the case below 45°, even with armour below the power of the shot. At sea this calculation is seldom useful because the angle of incidence is seldom known,† so that the maximum effect possible (*i.e.* direct perforation) is more important. In a siege, however, oblique perforation might be required.

Old-type guns and a few new guns firing projectiles of large calibre in proportion to their weight have less penetration than that given by the above rule; while long guns of the future, like some of Krupp's, with a calibre which is very small in proportion to their weight, may obtain greater perforation than given by the rule of thumb if fired under very favourable conditions.

On the whole, then, it may be concluded that it is useless to fire at wrought-iron plates with less than 1000 ft. striking velocity for each calibre in the thickness of the plate attacked, further allowance

* For more full directions, see *Annuals* for 1886, 1887.

† A vessel attacking a fort might increase the resisting power of her side armour by maintaining an oblique position.

being necessary with old-type guns, in oblique fire, and also some allowance for backing.

Diagrams. For immediate use in connection with service guns, projectiles and charges, the late General Inglis prepared a diagram on which perforations can be read off at a glance. If the charge differs from that specified on the diagram, the perforation for any given velocity is correctly shown, but the range at which this is marked will no longer be correct.

General Maitland made a diagram which may be employed for any question of perforation of iron. It is less quickly used and less simple than that of General Inglis, but it is available for experimental and irregular conditions, it gives more information than any other, and in using it an actual process of calculation is mechanically performed which is perhaps more perfect in theory than any other known in England.*

The diagrams, Pls. VII., VIII., IX. and X., are based on a series that owe their origin to the official one prepared by Colonel Noble in 1873, and are corrected up to date. Foreign ships were given by Captain Grenfell, R.N., in *Engineering*, and have been shown for some years past in the Austrian *Marine Almanack* as well as in the *British Navy*. To give to these diagrams a definite practical character, the following course has been followed.

On the supposition that 3000 yards is the maximum range at which side armour will be systematically attacked, all projectiles perforating up to 3000 yards are shown with a clear blank hole. For every perforation effected only at shorter ranges, the limit of range is entered in or near the hole. Thus, any officer finding armour corresponding to that of his enemy with a blank hole opposite his gun on the diagram, may hope to perforate *with a direct hit* at least up to 3000 yards. Should he find a number less than 3000 yards entered, he must not expect to perforate beyond the range so entered.

The armour is wrought iron. It is only approximately representative. The types are chiefly French. The perforation includes backing and skin.

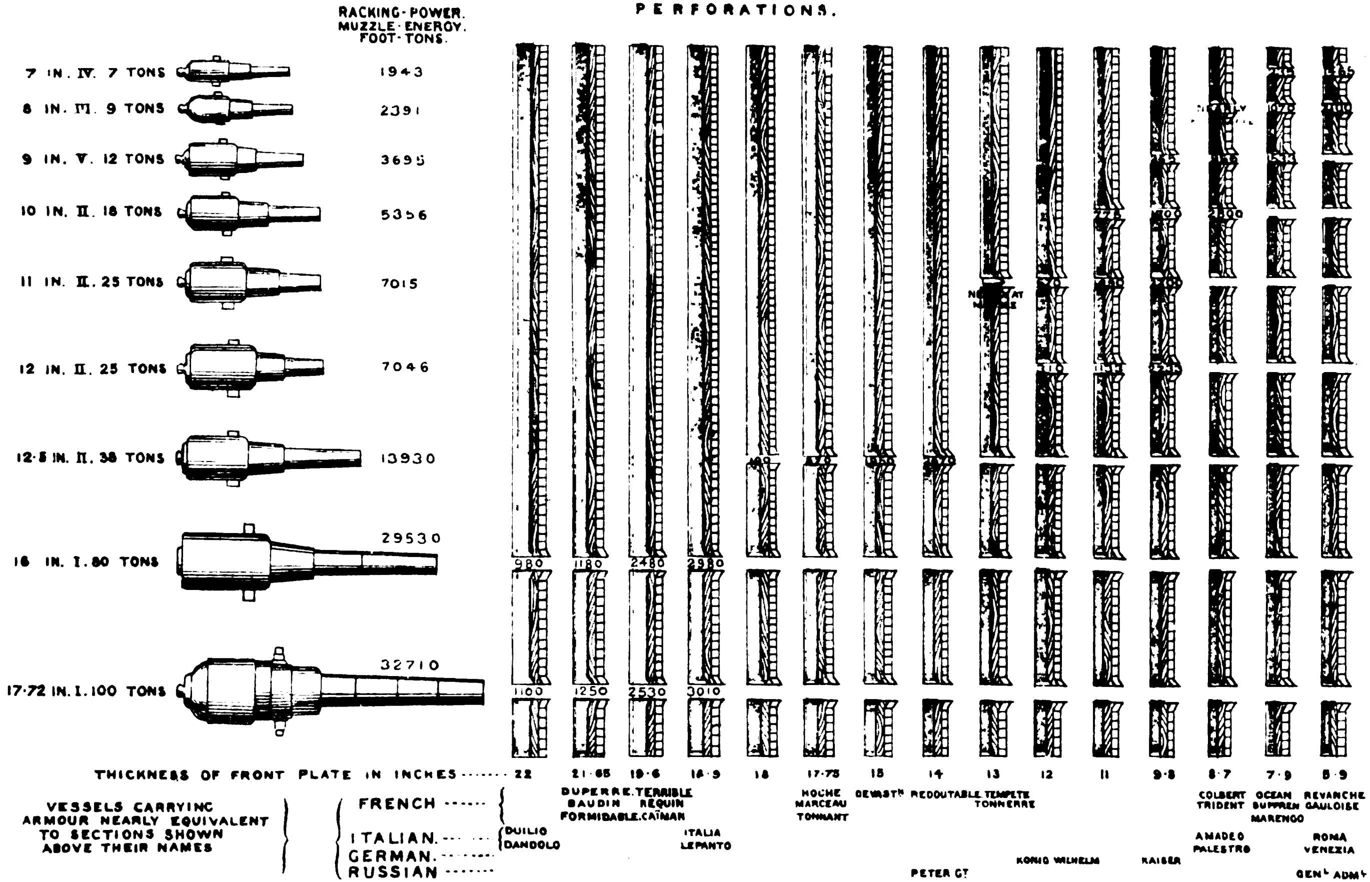
General Maitland's diagram has been used for calculating loss of velocity at each range. On service each hit would have less power to perforate than is indicated on the diagrams, in proportion as it strikes more obliquely.

* Major Willoughby, R.A., has recently submitted a slide-rule to the Ordnance Committee, by which problems in plate-firing are worked mechanically by logarithms divisions on scales rapidly. This offers great advantages in simplicity, in speed, and in portability.

Pl. VII.

BRITISH M.L. GUNS.

PERFORATIONS.



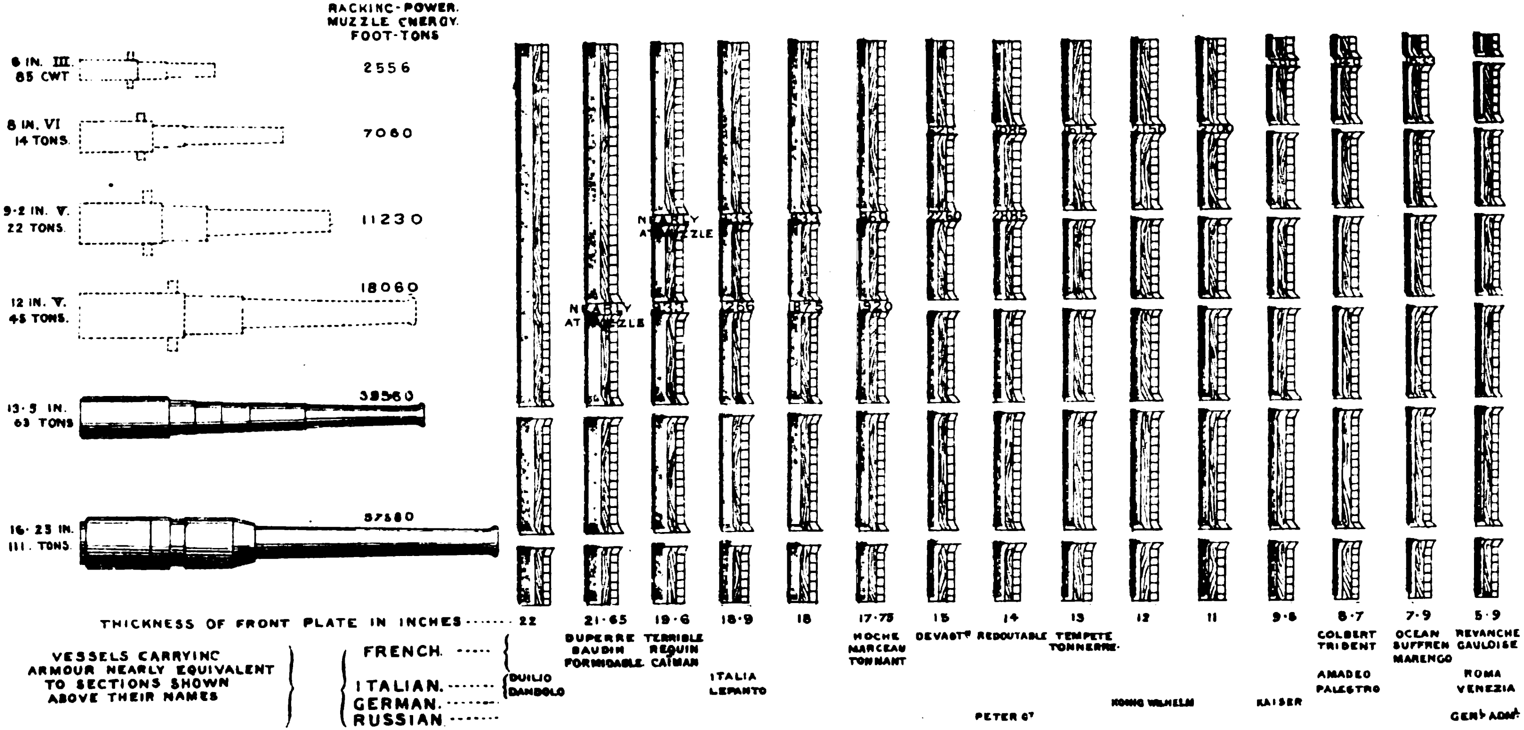
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE – 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN.

BRITISH B.L. GUNS.

PERFORATION.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

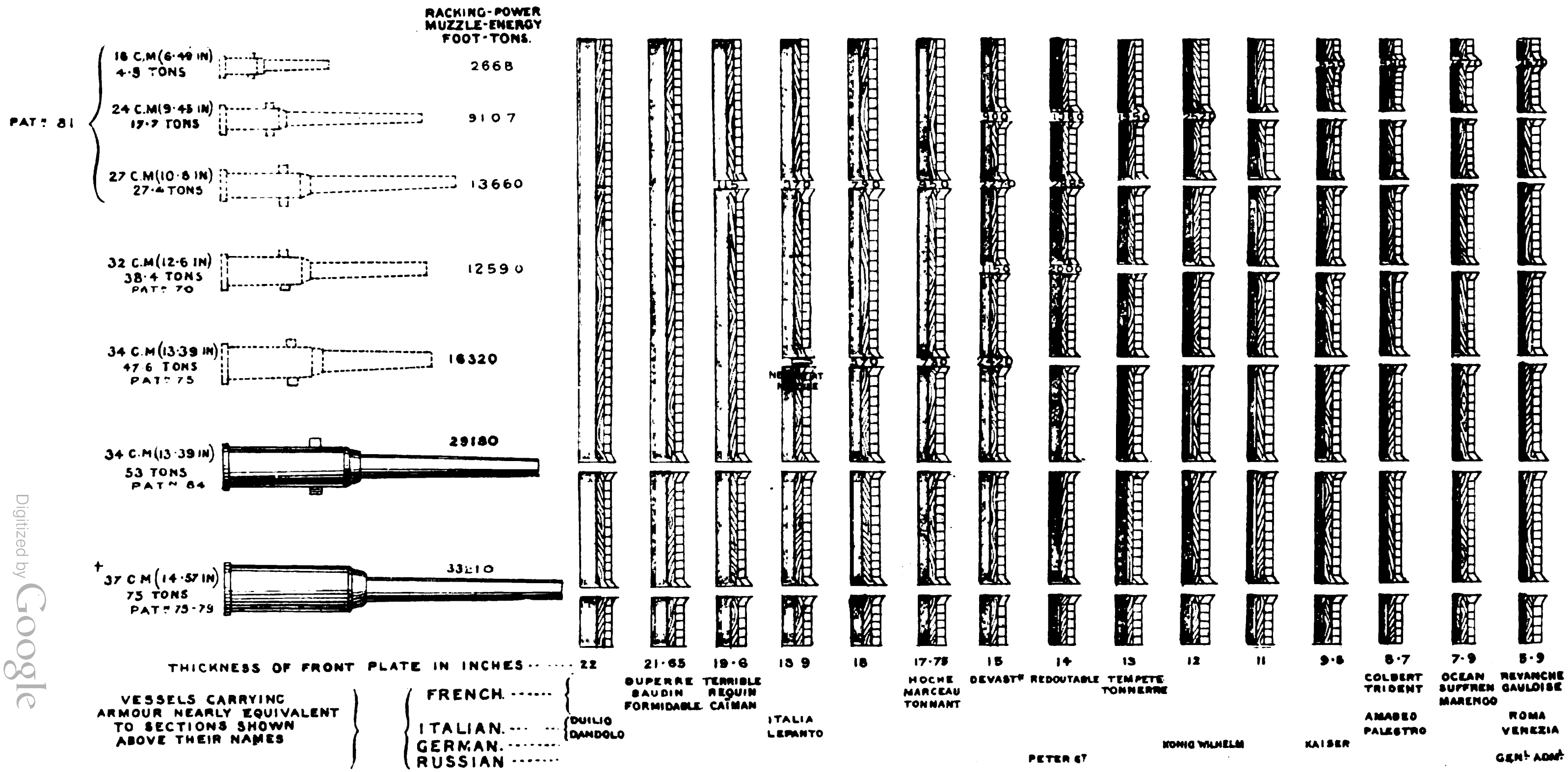
SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN. SKIN.

Pl. IX.

FRENCH GUNS.

PERFORATIONS.



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

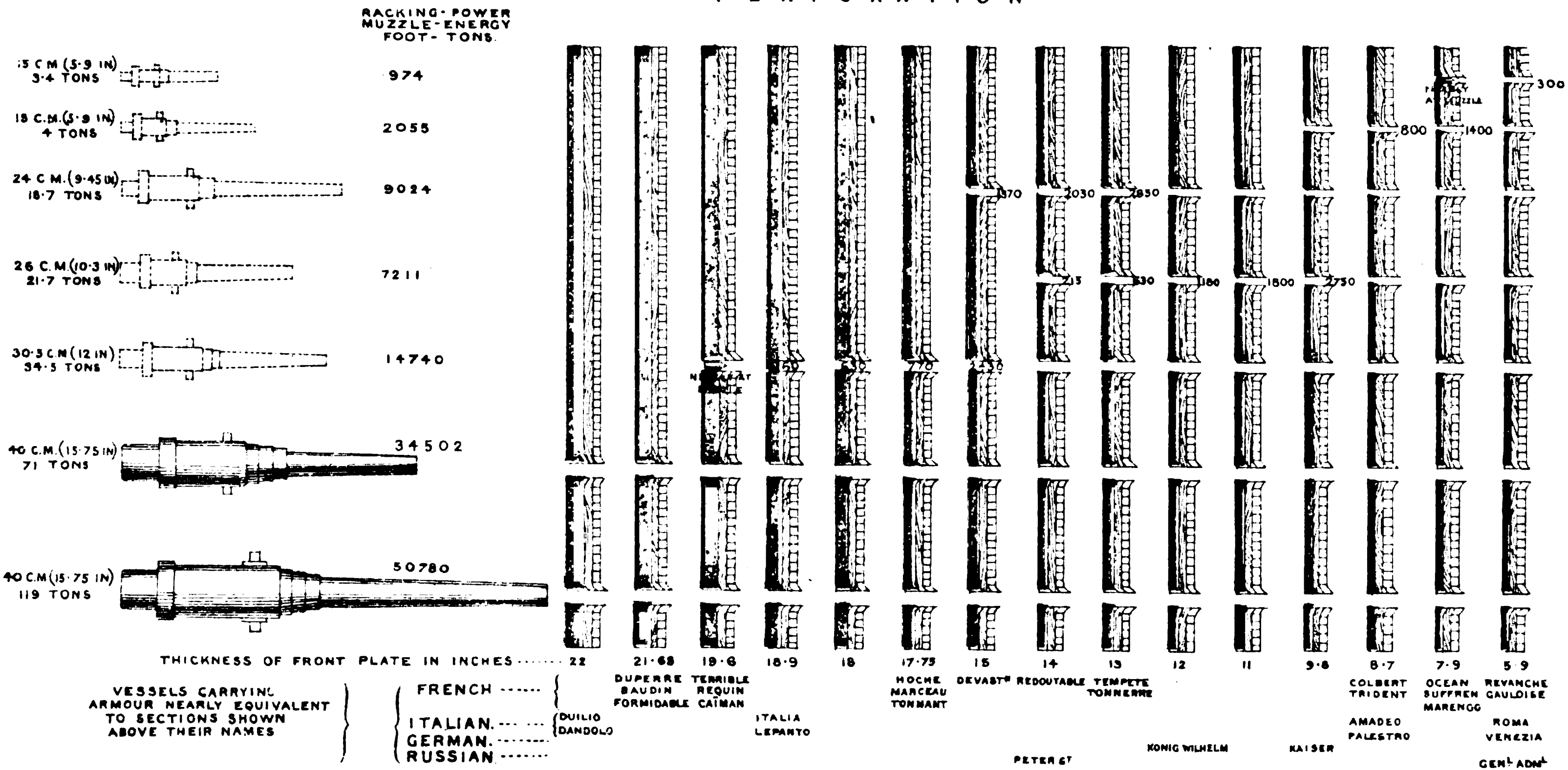
SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

+ A GUN OF 42 C.M OF OLDER TYPE PATTERN 1875, WEIGHING 74·6 TONS IS SHOWN IN TABLE WITH MORE ENERGY THAN THE 37 C.M. GUN HERE DEPICTED, AND NEARLY EQUAL PERFORATION SEE TABLE OF FRENCH NAVAL ORDNANCE.

GERMAN GUNS

PERFORATION



A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS: MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE – 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE, DOTTED GUNS ONLY AS TO LENGTH.

ALL BACKING IS 18 IN. OF WOOD WITH $1\frac{1}{2}$ IN. SKIN.

The diagrams must be regarded as only approximate. They may, however, be of practical value, for an officer may be able to see at a glance that some ship's armour is *well within the power of his guns* or *quite beyond them*, and behave accordingly.

All armour-clad vessels built prior to 1876, and many subsequently, are *iron*-plated. To these the above directions apply. The question may naturally be asked, why ships clad in steel and compound armour are treated as if only sheathed in the same thickness of wrought iron. The reply is that the object is to furnish a low limit for guns available for attack. In experimental firing, steel and compound plates have often been attacked and have suffered when projectiles have been employed just capable of perforating wrought iron of the thickness of the steel in question. The yielding is more or less by fracture, and is a gradual process; still it would not be right to fix the limit higher, and to say that guns capable of such effects were useless for attack of such armour. Moreover, no other limit could be taken, seeing that some very soft steel armour exists approaching wrought iron in quality, though how closely it is impossible to say.

Thus it may be laid down that steel or steel-faced plates may be attacked by guns capable of perforating wrought iron of the same thickness as the plates in question. There will, however, be gradual destruction instead of perforation.

Hard armour.

Hard armour, then, including chilled iron and the harder steel and compound plates, cannot be perforated, and must be broken up before the structure behind it can be injured materially. A single hit will seldom do more than injure the armour itself. The harder kinds of such armour would suffer more than wrought iron from the continued fire of comparatively light guns. The smashing effect of a projectile on hard armour is probably in proportion to its *total energy*, irrespective of calibre.* It is difficult to apply any rule to the case of hard armour, but it is desirable as far as possible to concentrate and continue the fire about the same spot, and all guns are available for such work. Such an operation may seldom be feasible in engagements between ships.

* How greatly the power of guns to "smash" hard armour may differ from their powers of perforation may be seen by the fact that the 10-inch old-type, and 6-inch new-type guns on board the Nettle have nearly equal perforation, while the former has double the energy or smashing power (*vide* Diagrams) of the latter.

II.

Ordnance.*

Krupp's French rivals.

The *Times* of September 21st had an interesting article on the manufacture of war matériel in France for Foreign Powers. England, France, and Germany now possess private factories supplying war matériel by contract. The means possessed by the principal Powers for manufacturing war ships and war matériel fo themselves are thus enumerated.

England can manufacture at Woolwich, Elswick, and "at two c three private works," which hardly expresses fairly Whitworth' Nordenfelt's, Cammell's, Brown's, Firth's, Hadfield's, Vicker's, Easto and Anderson's, the Palmer Co., Stanner's Close, and smaller establisl ments for making guns and armour, to say nothing of all the shipyar where men-of-war are built by contract, which as well as Governme yards should be mentioned, if anything like a comparison is intended t be drawn between the productive powers of the countries dealt with.

France has Government dockyards at Toulon, Cherbourg, Brest Rochefort, L'Orient, and private ones at La Seyne, Marseilles, Havre, and elsewhere; and Government gun-factories at Ruelle, Nevers, St. Gervais, and a private one at Havre. The armour factories of France are not noticed (viz.) Schneider, St. Chamond, Marrell, and Chatillon and Commentry.

Germany has shipyards at Kiel, Stettin Wilhelmshaven, and Bremen, and the great gun factory of Krupp at Essen. Gruson's at Buckau for armament and armour, and Dillingen for armour should be added. Spain has dockyards at Cadiz, Ferrol, La Carraca and elsewhere, and the Hontoria gun factory at Trubia. The United States has Navy yards at Brooklyn, Boston, Norfolk, Philadelphia, and San Francisco; and several good private yards and gun factories at Washington, West Point, South Boston and Bethlehem, where armour is also made.

* *List of Authorities.*—The *Times*, the *Engineer*, *Engineering*, *La Nouvelle Revue*, M. Delbos of H.M.S. Britannia, and our Government Departments, &c., Elswick and Essen, have also been referred to for information.

Russia can complete ships at St. Petersburg, Sebastopol, and Nicolaieff, "although she prefers English armour and engines when she can get them." The Tjora works Kolpino should be given for armour. The article adds that nearly all other Powers depend on England, Germany, and France for the essential parts of their Naval armaments. There are, however, exceptions. Italy, with her great Terni Steel Works and Italian ship-building establishments in connection with Armstrong and Hawthorn is a notable one. Sweden has Finspong, which supplies Denmark with guns and has met orders for other countries for projectiles. Speaking generally, perhaps the statement that Italy, Austria, Norway, Sweden, Denmark, Holland, Greece, Brazil, the Argentine Republic, Chili, China, Japan, and Turkey, obtain their matériel from England, Germany, or France, may be allowed.

Twenty years ago England was almost the sole maker for foreign markets. Krupp soon entered the field, but France (in spite of M. Thiers, after 1871, thinking that it would be good to set up an opposition establishment to Essen) was by the force of tradition kept from entering this field of work until a law was passed on August 4th, 1885, allowing the exportation of heavy guns and other arms. The works of Le Creusot, Firminy, Terre Noire, St. Chamond, and others, were in a position to compete at once with England and Germany. La Société des Forges et Chantiers de la Méditerranée showed a prominent exhibit of guns on the Canet design in the Paris Exhibition in 1889, from a 32-cm. (12·8-in.) gun down to quick-firing and field guns of 4·8-in. and 3-in. calibre as well as other stores. To the productions of this company alone the remainder of the article is devoted. It has three large establishments at Havre, at Marseilles, and at La Seyne, near Toulon. M. Canet (formerly an assistant of Vavasseur's before Elswick had swallowed the establishment at Bear Lane, Southwark) is in charge of the war matériel. M. Canet is a man of remarkable powers combining high mathematics with fertility in design. It is difficult to say what share such a man may have had in shaping many features which are embodied in modern guns and carriages. The guns herein dealt with are mainly remarkable as being exaggerated specimens of new-type guns. The 12·8-in. gun is 40 calibres in length.* Two 10·8-in. guns and three of 6-inch bore are 36 calibres long. The breech-closing arrangements closely resemble those now adopted in this country.

Canet guns.

* Queen Elizabeth's "Pocket Pistol" in Dover Castle, with a calibre of 4·75 inches and a length of 24 feet, still holds its own as to length, namely about 60 calibres.

The following table is given to show the superiority of the 6-inch gun of the Canet type over others. These figures work out an energy

	Canet.	British.	Austrian.	German.	Russian.	Spanish.	United States.
Weight of gun in lbs.	9,532	11,200	7,504	9,048	9,114	12,544	10,192
Length of gun in inches	212	192	146	176	140	165	196
Weight of projectile in lbs.	88	100	69½	112	86	93	100
Weight of charge in lbs.	42	42	21	33	18	26½	50
Muzzle velocity in feet per second	2,165	1,920	1,562	1,624	1,463	1,631	2,105
Muzzle energy in foot-tons	2,841	2,556	1,435	2,055	1,276	1,729	3,072
Muzzle penetration of iron, in inches	12·3	12·1	9·1	11·0	8·4	9·6	13·4

per ton for the Canet gun of 668 foot-tons, compared with 511 for the English and 675 for the American. The actual English energy is more than here shown, viz. 533 per ton of gun (*vide* Table of British Ordnance). It falls, however, far below the Canet and American guns. These are both longer guns. The American is much the best if an actual result, and not only an estimated one. It is well to point out that most of the figures received from America hitherto are estimates not yet realised.

A report of results achieved by a Canet (27-cm. 10·63-in.) gun, 36 calibres long, at Spezia, obtained from another source,* naturally connects itself with the above statements. These results are shown in the following table converted into English measures.

Date.	Weight of Projectile.	Weight of Charge.	Pressure in Tons	Muzzle velocities in feet.	Muzzle energy.
	lbs.	lbs.			foot tons.
October 22nd	445·3	209·0	8·65	2,008	12,450
Ditto	553·4	278·4	13·56	2,179	18,230
October 23rd	551·2	Ditto	15·88	2,192	18,410
Ditto	553·4	Ditto	16·02	2,195	1,848
Ditto	440·9	Ditto	15·48	2,356	1,697
October 25th	445·3	209·0	10·23	2,031	12,740
Ditto	471·8	Ditto	10·99	1,903	11,810

* L. Delbos, French Professor, H.M.S. Britannia.

The 27-cm. (10·8-in.) French gun pattern 1881 had 13,660 foot-tons muzzle energy, which is nearly 410 foot-tons per ton of gun.

French guns of all natures for naval service and nearly all for coast defence are now made wholly of steel. The natures are given on Table of French Ordnance. Guns of the 1870 pattern, 14, 16, 19, 24, 27, and 32-cm., from 20 to 22 calibres long, are of cast-iron, with steel tubes inserted 9 to 10 calibres long, and $\frac{1}{4}$ of a calibre in thickness. The tubes are screwed in and are larger at the breech end. They extend 3 calibres beyond the point of the projectile. Wetteren powder is used. French ordnance generally.

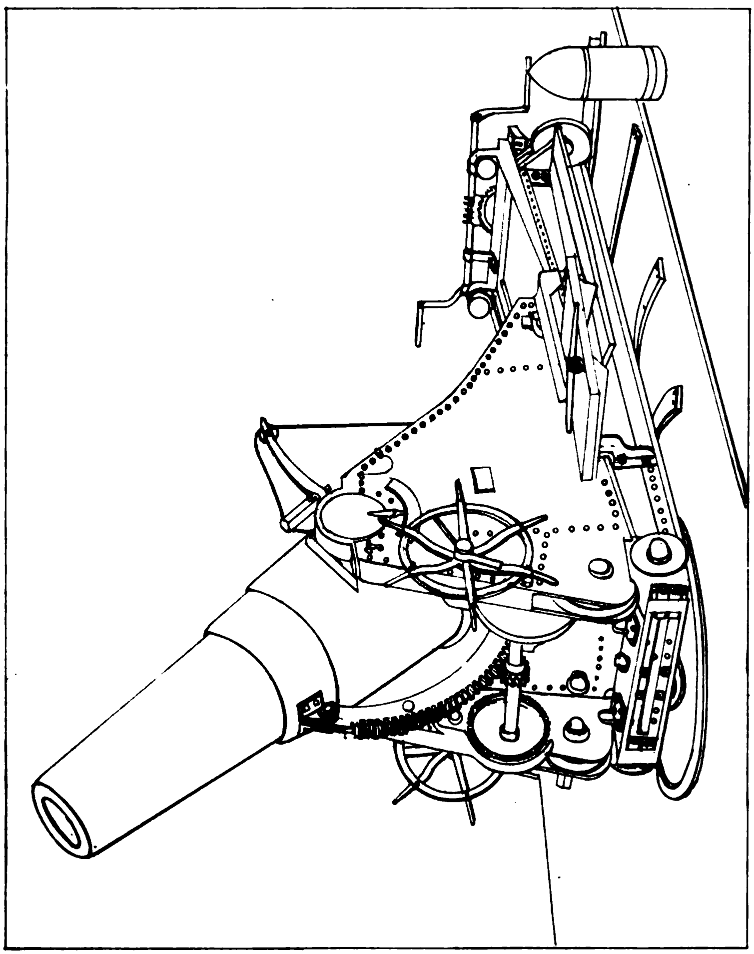
Guns of 1875 model are all steel, and with cocoa powder give a muzzle velocity of about 486 metres (1595 feet), 500 metres (1640 feet) is obtained with a pressure of from 2600 to 2800 atmospheres (17·06 to 18·37 tons). The charge is about $\frac{1}{3}$ the weight of the projectile. In the model 1875–1879, 27, 28, 34 and 37-cm. the charge is $\frac{1}{2}$ the weight of the projectile. The guns of 1881 model are chiefly 30 calibres long, giving 520 mètres velocity (1706 feet); and the model 1884 are of greater length, giving 600-m· velocity (1969 feet). The metal does not éxceed 15-cm. (5·9-in.), thick. Slow-burning powder $\frac{4}{10}$ the weight of the projectile is used. A gun of 16-cm. (6·3-in.) type, 1884, gave a velocity of 815 m. (2674 feet) with a pressure of 290 atmospheres—19 tons. The latest model is that of 1887, 45 calibres long, 16, 19, and 34-cm. guns exist. With "poudre fagot" charges a velocity of 800 m. (2625 feet) is obtained. The 32-cm. gun has taken the place of that of 34-cm. (13·39-in.) The former is said to be able to perforate 87-cm. (34·25 inches) of iron.

A long article by C. J. L'Estrange on the manufacturing achievements of Essen, and on Ordnance more particularly, appeared in the *Illustrated Naval and Military Magazine*. It was well illustrated, and based on the official publications of Krupp, 1879–1888. The writer gives a brief account of the early struggles of the Krupp factory at Essen. This was, however, given at much greater length in a work written by Alfred Krupp himself, and published during the past year. The total output of the Essen Steel Works is given as exceeding a quarter of a million tons, of which three-fifths is for commercial purposes; 3100 tons of coal and coke are burnt daily. The Krupp field-guns and system of breech-closing are described in detail, and results obtained with a 15-cm. (5·9-in.) 35-calibre gun are given. The gun, undoubtedly a very powerful one, the muzzle energy being Krupp artillery.

over 2641 foot-tons, and as the piece weighs 4·69 tons only, this result implies an energy of 562·7 foot-tons per ton of gun. It does not, however, appear to have been adopted for the German Navy, the most powerful 15-cm. gun given in the tables being one which has only a muzzle energy of 2055 foot-tons. The most powerful corresponding gun in the British Navy is the 6-inch B. L. gun, 14½ feet long (26 calibres bore), which has a muzzle energy of 2665 foot-tons, which slightly exceeds the most powerful Krupp piece. Its weight, however, is greater, namely, 5 tons, which gives an energy per ton of 533 foot-tons. It is, therefore, not quite so profitable a gun, weight for weight, as the Krupp long gun, which is to be expected from its length being curtailed to a more convenient limit. It beats the Krupp service-gun, which weighs a little over 4 tons, and has an energy per ton of 514 foot-tons. The long Krupp is probably only to be regarded as an experimental piece, whose extreme length constitutes an objection as a service arm.

Howitzer for high-angle fire.

Another piece dealt with in this article is the 28-cm. (11-inch) Howitzer for high-angle firing (see Pl. XI.). This is chiefly interesting as bearing upon the question of the attack of ships' decks from land; especially because this kind of fire is adopted for the protection of our coaling stations, necessitating as it does very little expense, and constituting a danger which no ship can afford to disregard. Krupp, in 1879, fired this Howitzer at a target representing the Inflexible deck with a measure of success which was fully appreciated in England. Pointed as it was by the selection of a ship for a target, the lesson was the more obvious. Uncertain as such fire is, it constitutes so formidable an element in defence, that it is likely to be a permanent one. Its limits of scope, however, deserve careful observation. The lowest achievement to be expected is that it may make it dangerous for ships to anchor. Thus it becomes difficult for them to creep slowly and take up a position in water uncleared of submarine mines, and accuracy of fire is greatly diminished when ships are in motion. It is important to learn what are the chances of hitting a ship at any given range, and what effect may be expected to be produced by such a hit from a shell falling at a high angle. In 1879 the Inflexible deck target was struck by five out of ten rounds at a range of 7327 yards (over 4 miles). L'Estrange in his article states that firing was carried on at 7800 mètres (nearly 5 miles), and that since the introduction of prismatic brown powder a charge of 28 kg. (61·73 lbs.) carried a projectile weighing 216 kg. (476·2 lbs.) at 45° elevation a distance of about 9864 mètres (10,788 yards, or over 6 miles). The time of flight was 47·6 seconds. The longitudinal



THE 28-CM. RIFLED KRUPP HOWITZER ON COAST CARRIAGE.

deviation was 119 mètres (390·4 feet) and the lateral 49 mètres (160·8 feet). This means that at six miles range the projectiles all fell within an area exceeding the length of the Inflexible by 70 feet, and exceeding her breadth by 86 feet. It is probable that shore batteries with plenty of ammunition and good means of judging position might engage ships with high-angle fire at long ranges, six miles appears to be an excessive range, but if the chances of hitting are sufficient to prevent ships anchoring within six miles, the gain is substantial. Clearly, with projectiles remaining 47·6 seconds in the air the chances of hitting a moving ship are small. Next, as to the damage to be expected on impact. Cast-iron shells, it seems, broke up against 75 mm., 3-inch deck plates, bending them but slightly. 50 mm. (2-inch plates) were completely broken by them, but an armour-piercing steel shell of 255 kg. (562 lbs.), with a striking velocity of only 135 mètres (442·9 feet), meant to imitate a falling velocity, not only shattered the 3-inch plate, but remained intact itself; and a chilled iron shell weighing 230 kg. (507 lbs.), with about 175 mètres (574 feet) velocity, passed through a 3-inch plate at 60 degrees angle of impact with the plate face.

This seems to imply that high angle fire against ships' decks should be carried on with armour-piercing projectiles to be certain of perforation, in the case of a 3-inch steel deck. Such a deck is at present an exceptionally thick one. Common shell might pass through 2-inch decks and burst with considerable effect, but two chances of failure still exist; first, the shell may fall with the axis inclined so as to weaken it; and secondly, the armoured deck may not be the first one struck. Common shell would often break up in passing through an unarmoured deck structure, and fail to injure the armoured deck beneath. On the other hand, the bursting-charge question is complicated with steel shells, and chilled shells hold but small bursting charges. Deck attack on the whole would be serious, but is very unlikely to be fatal to a ship. We may congratulate ourselves on the fact that the old Woolwich 7, 8, and 9-inch guns with the chilled shells and other ammunition are fairly serviceable weapons for high-angle fire.

L'Estrange's paper finally deals with the heavy 40-cm. (15·75-in.) Krupp gun of 119 tons weight. He states that in two rounds with a charge of 384 kg. (846·6 lbs.), a shell of 1054 kg. (2,315 lbs.) obtained a muzzle velocity of 579 mètres (1900 ft.), and a muzzle energy of 57,950 ft.-tons. This is the highest on record from any gun, the Elswick 111-ton gun having attained 57,630 foot-tons. The pressures were 19·5 tons and 19·9 tons respectively, and the work **Krupp's 119-ton gun.**

per ton of each good, namely 488 and 519 respectively. There is little to choose between these results. The Krupp gun is the heavier, and should be more powerful. This it is, and although the figure of work per ton is considerably behind the Elswick gun, the pressure is rather lower. These figures will also be found in the official report printed at Essen, of Meppen trials of August and September, 1886.

At Spezia, the gun was only fired with a charge of 300 kg. (6614 lbs.), and a projectile of 920 kg. (2028 lbs.). This gave a muzzle velocity of 555 mètres (1821 feet), and a muzzle energy of 46,630 ft.-tons. The official report states that 82 rounds were fired at Meppen without any enlargement of the bore. The report that a 130-ton gun had been recently manufactured by Krupp is untrue. The 119-ton gun is the heaviest piece that has yet been made.

Admiral Scott on our guns.

Admiral Scott wrote two pamphlets,* published in 1889, dealing chiefly with the question of the rifling of our guns, which he strongly condemns. The "nip" on the projectile, so he urges, holds it back till a high velocity is generated; then it springs forward, rifled in a moment, to experience the further resistance due to the increasing twist in the grooves, the projectiles being "whirled by their heels" till they experience a new action in the uniform run to the muzzle. Unquestionably, Admiral Scott points out a source of complication in the increasing twist. With our large slow-burning charges our bores are frightfully eaten away by the rush of gas, and erosion is more difficult to prevent with an increasing than with a uniform twist, because it is more difficult to prevent all windage. Nevertheless, Admiral Scott's arguments would point rather to guns yielding at a place where they do not generally fail, namely, some intermediate position in the bore; whereas erosion tells most a little in advance of the shot-grip, and, with very slow charges, the guns have failed near the muzzle. Certainly Admiral Scott's statements and suggestions ought to be examined in connection with the records of the wear of our guns. These are not lasting so well, that we can afford to disregard such an opinion as that of Admiral Scott.

Accidents to guns.

Sheerness accident.

On June 27th, 1889,† a 40-pounder B.L. Armstrong gun of very old pattern, made in 1862, burst explosively at Sheerness, at about 30 in. from the muzzle, injuring three men. No special interest, from a manufacturing point of view, belongs to this circumstance, as

* *The Great Gun Question* and *Muzzle and Breech-loading Ordnance: Causes of their Failures and Prevention.* Wightman & Co., 104, Regency Street, Westminster.

† See *Engineer*, July 5, for figure showing fractures.

16·25 INCH 110½ TON B.L. ARMSTRONG GUN PART A. (MARK I.)
FOR GUNS Nos. 6 AND 7 CYLINDER 39' REPLACES 5 HOOPS 3G, 3H, 3I, 3J, 3K.

ELSWICK 110½ TON GUN.

for H.M.S. Victoria.

Fig. 1.

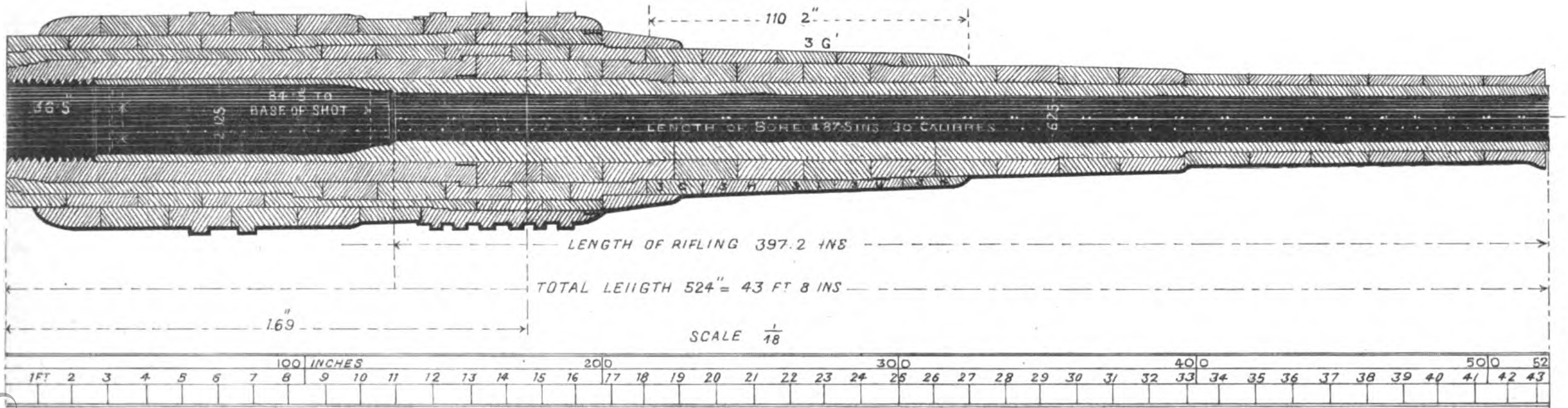
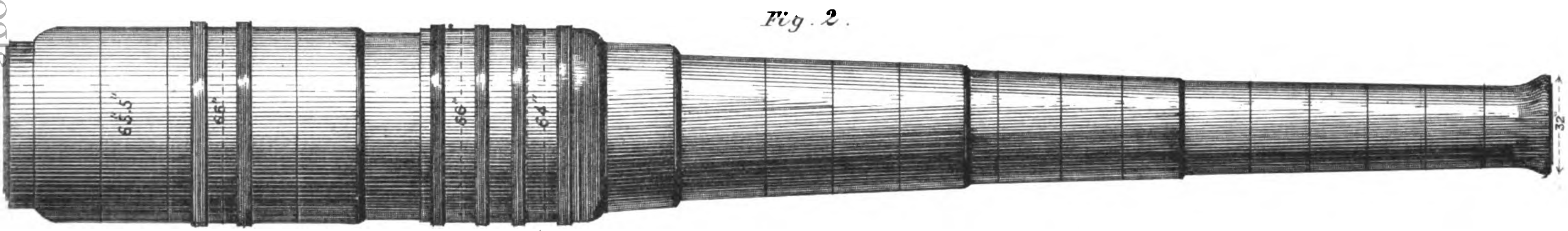


Fig. 2.



it is an old gun, firing old-fashioned charges. There is some reason to believe that a drill-shot was lying in the bore.

Ajax accident. A more serious accident took place on September 2nd, 1889,* on board H.M.S. Ajax, on her return to the Clyde after the Naval Manœuvres, when a 38-ton M.L. gun burst in the chase, slightly injuring one man of the detachment. The shell, it is said, burst in the bore; but no gun ought to yield under such circumstances. This gun is still a powerful and important piece, though a muzzle-loading gun of old type, made of wrought-iron, with steel tube only. The case, however, does not bear on the more important question of the behaviour of our new-type guns with slow-burning powder.

Victoria 111-ton guns. *Victoria 111-ton guns.*—When first delivered, one of the 111-ton guns supplied from Elswick for H.M.S Victoria was found to droop slightly at the muzzle, and was returned for additional stiffening to the barrel. It was afterwards delivered, and passed as satisfactory (Pl. XII., figs. 1 and 2).

Fig. 1 shows the nature of the fault and the means by which it was remedied. Hoops 3 g, 3 h, 3 i, 3 j and 3 k, moved slightly in position,† the gun then had a tendency to droop so as to press these hoops together at their lowest points. The remedy was found by substituting the single hoop 3 g_1 for the five previously employed. In future patterns a long hoop may also be put on in front of 3 g_1.

New Elswick mounting. Pl. XIII. shows a new design for mounting the 9·2-in. breech-loading gun on board ship so as to command a large vertical angle as well as all-round fire. The principal features are as follows:—Elevation up to 40 deg. can be given with the smallest possible port-hole in the shield. Such elevation would only be required in exceptional cases, such as firing at a very extreme range, which on board ship is wild work, and would only be effectual for work of a general bombardment, or in such a case as a ship passing up the Dardanelles and engaging forts on the heights. The training is effected on a deck below the mounting, and, if performed by hand, the men working it are completely separated from those fighting the gun. The recoil is absorbed in the usual way by means of the Vavasseur buffer; but, as the slide is horizontal, a strong spring which is compressed on recoil is used for running the gun out again. There is a new device also for stowing projectiles, which are carried in a ring encircling the gun platform, which is capable of very easy movement, so that any projectile required can be brought opposite to a door in the platform

* *Times*, September 4th, 1889.

† See movement of central tubes of guns of Redoutable, p. 369.

and readily obtained for loading. The structure supporting the gun and mounting is separated from the armour which protects it, as shown in Pl. XIII., so that should the latter be struck, no damage would be done to the structure. The powder is brought up a central tube, and then passed on to the movable platform. The gun can be elevated by the man in side position direct, and if steam is used, can also be trained direct by the same man; but, if hand-power is in use for training, he works a tell-tale, and so directs the numbers in the training movements.

Naval heavy ordnance. More than one expression of opinion on the question of the best heavy gun for the Navy has made itself heard during the past year. Undoubtedly the general feeling among naval officers is against very heavy ordnance. The 111-ton gun is regarded by many as introduced to prove that England has the heaviest guns afloat, and to silence any attack based on the opposite state of things.

Longridge on naval guns. In a pamphlet, designated "Naval Guns and their Supply," Mr. Longridge makes a comparison of the powers of various ships on a sytem of estimation peculiar to himself—namely, the product of displacement in tons, muzzle energy per ton, penetrative power, and speed, multiplied together. His reasoning in favour of wire guns is of more importance, and probably most officers would endorse his complaint, that we have not long since had a substantial supply of these guns, seeing that they are generally admitted to be on the most powerful system of construction known. A wire gun, it is to be remembered, was selected to fire the Shoeburyness "Jubilee" rounds in 1888. Mr. Longridge maintains that wire guns can be made very much faster and cheaper than any other steel guns.

***La Nouvelle Revue* on difficulties with French heavy guns.** A very interesting article, entitled "La Marine Française au printemps de 1889," appeared in *La Nouvelle Revue* of May the 15th, 1889, in which the following statements are made on Naval guns:—

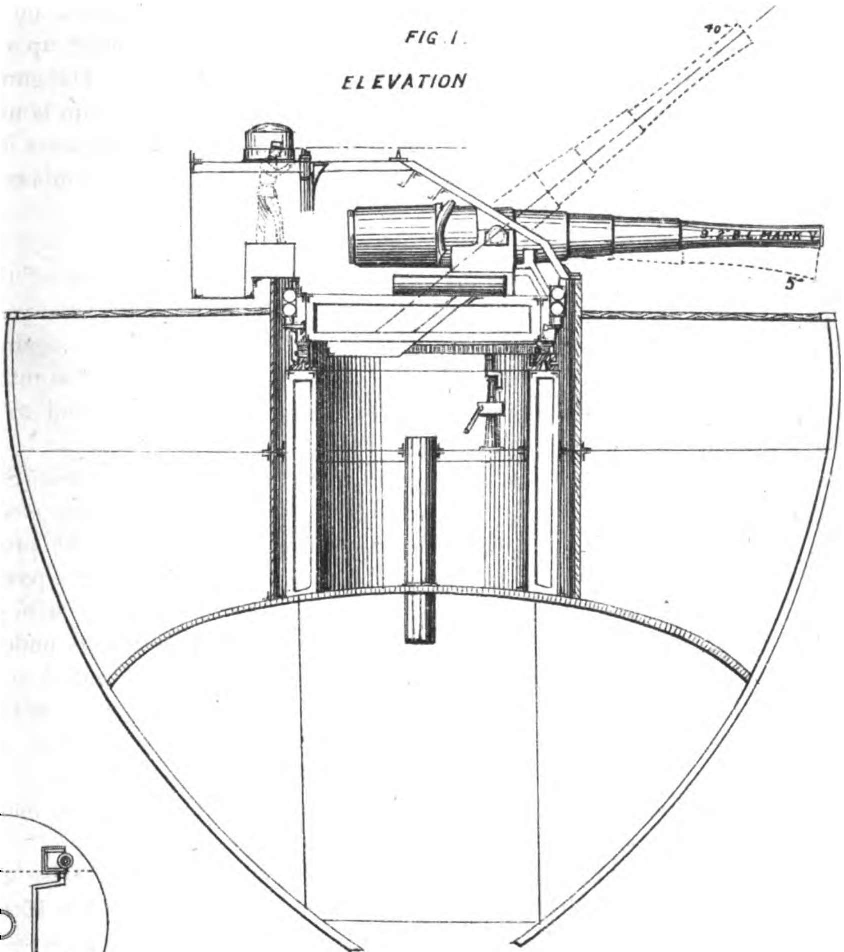
"42-*cm.* (16·54-*in.*) *guns.*—These monsters are too heavy, and injure their supporting structures. Further, their construction is but middling. We have rejected this type, after having been obliged to shorten the pieces of the Indomptable, which had yielded at the muzzle.

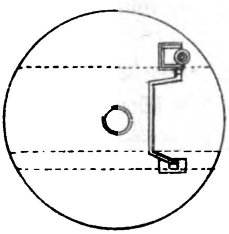
"37-*cm.* (14·57-*in.*) *guns.*—These exist only on the Amiral-Baudin and Formidable.

"34-*cm.* (13·39-*in.*) *guns.*—These compose the armament of the Amiral Duperré, Amiral Courbet, and the Devastation. All these are condemned since the fatal Duperré accident, for all have been found bad on close examination. The Devastation has gone to Brest

FIG. I.

ELEVATION





PLAN.

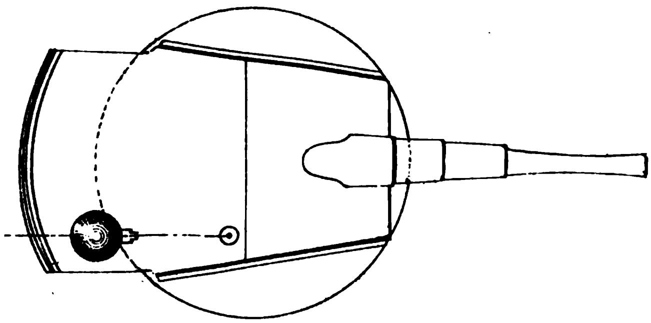


FIG. 2.

to exchange her pieces. The paper (*Le Temps*, April 26) which announced this, added that there were no reliable guns of the same calibre to exchange with them, and they have, it seems, to be replaced by 32-cm. (12·6-inch) coast guns of inferior type and power.

"27-*cm.* (10·63-*in.*) *guns.*—(No. 1. Newest pattern).—These form the armament of the Redoubtable. They have one principal defect—a central tube which slips. At the last moment, before sailing, one of the barbette-tower guns could not be fired, and had to be replaced by another from the forecastle, which itself had to be replaced by a dissimilar piece. Thus the Redoubtable is in the same position as the Devastation, the Duperré, and the Courbet. Will she also have to go to Toulon to change her armament?

"19- *and* 16-*cm.* (7·48 *and* 6·30-*in.*) *guns.*—These are reported good, but have not been tested by those who are interested in reporting the whole truth—namely, the officers of the ship.

"14-*cm.* (5·51-*in.*) *guns.* These are not reliable. Also their range tables are bad. They form the basis of the armour-clad's light armament. 'What,' it is asked, 'is France to depend on if these are not able to bear every test?'

"*Projectiles.*—42-cm. and 37-cm. (16·54 and 14·96-in.) projectiles (query, forged steel or chilled iron) have been ruptured by molecular action in a hard frost. Many smaller ones have broken in the bores of guns. As to melinite projectiles, the Navy have had none for months."

Present State of British Guns.

As to British guns, it is satisfactory to be able to record that the supply is better provided as time goes on. Fresh private firms are fulfilling contracts for smaller guns, although it cannot be said that everything has shaped itself as completely as could be wished. The best system appears to be for the Royal Arsenal to make a small proportion of every kind of gun, carriage, and ammunition to serve as samples; while private firms make the bulk of such stores as they can manufacture satisfactorily. The heaviest ordnance would probably be made only at Elswick, but light guns can be turned out in many works. By this means our single Arsenal might be supplemented by factories, which might be, in a measure, supported by orders for foreign governments, but whose whole powers would be immediately available for England if war were declared. At present, the Royal Arsenal has neither made the heaviest guns, nor the steel armour-piercing projectiles; for these we have wholly depended on private factories. On the other hand, large quantities of stores have

been made in the Arsenal which might have been invaluable in developing the private factories, which are so necessary to the country. With regard to the behaviour of our ordnance, we have not been without our difficulties. Guns have burst, as noticed above, and have suffered greatly from wear and tear. Such as have burst have yielded near the muzzle. This is to be attributed to the system of slow burning charges and great length of bore being carried further with the powder than with the gun. Energy is developed by a slow charge in the form of a low maximum pressure kept up through the length of the bore. A very low pressure for the powder-chamber may be so far kept up as to burst a weak chase. This evil is not difficult to rectify. Trouble has been caused by it, but no loss of life. Wear and tear is a greater difficulty: so excessive is the erosion or scoring, that it has been doubted, on high authority, if our ships' heavy guns would not become very inaccurate, and require relining, before even discharging the very limited supply of ammunition which they carry. It is urged that just as a ship may be driven through the water at an unprofitable speed, so projectiles have been fired at unprofitably high velocities. When new-type guns came in in 1878–79, the manufacture of ordnance had become a matter of trade competition, as well as of national rivalry. The former appears to be the more urgent incentive to improvement, seeing that almost every step in advance is first taken in a private factory. The energy developed by a new gun is published, and is a more tangible feature than the wear and tear, or even than the strain which most tries the gun; indeed, where the latter does not entail a high maximum pressure, it may never be made known. The above result, then, is what might have been anticipated. Judging from the accounts in French papers, given on p. 368, it cannot be doubted the French have as great or greater difficulties than any we have experienced. As to the remedy to the above difficulties, it has been urged that a comparatively slight reduction in energy would enormously ease the guns; also that gas-checks might be improved. Our increasing twist increases the difficulty in making tight closure against all windage, and calls for peculiar care. The present tendency is for the length of guns to increase still further; the slowness of powder must exactly correspond with it. Guns may be eased or energy increased by such means. It is for naval officers and constructors to say when increased energy is more than counterbalanced by increased inconvenience.

Difficulties with English guns.

GRUSON'S JOINTED PIVOT MOUNTING.

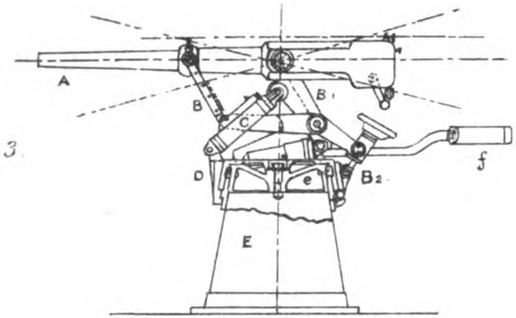


Fig. 3.

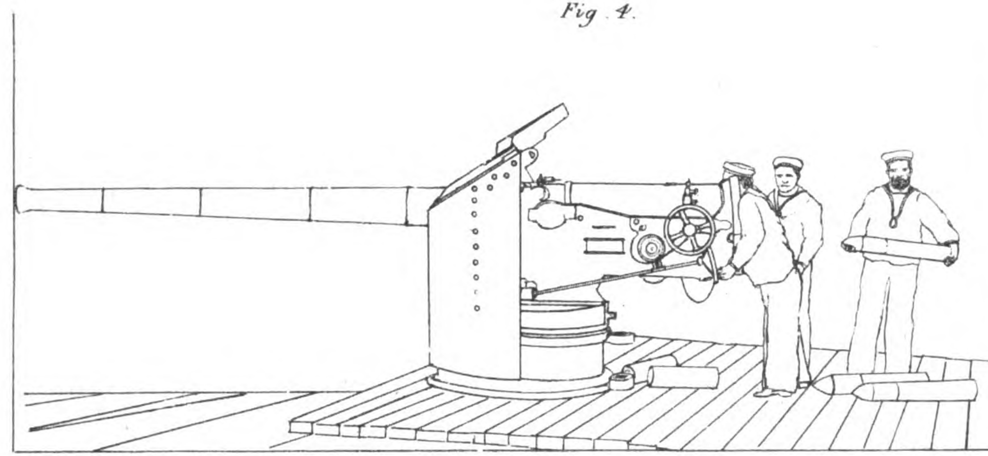


Fig. 4.

THE PARIS EXHIBITION–HOTCHKISS ORDNANCE.

Fig. 2.

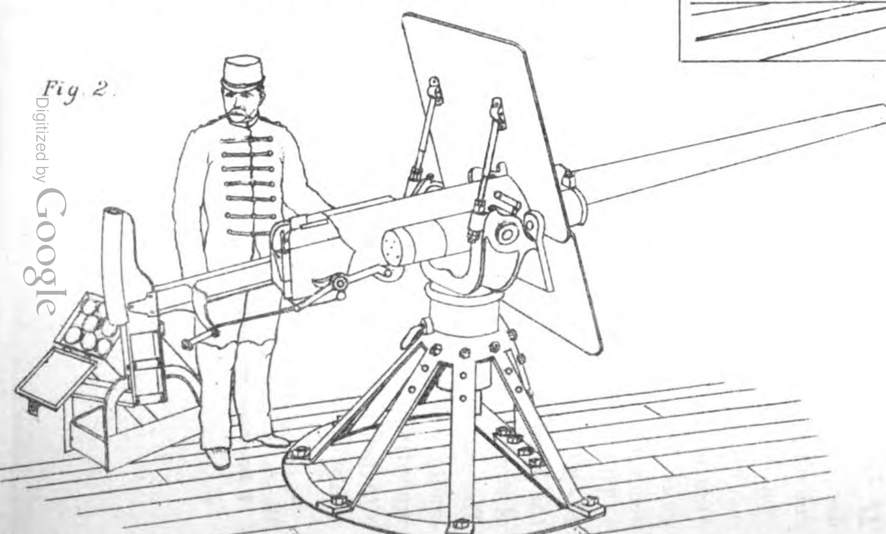
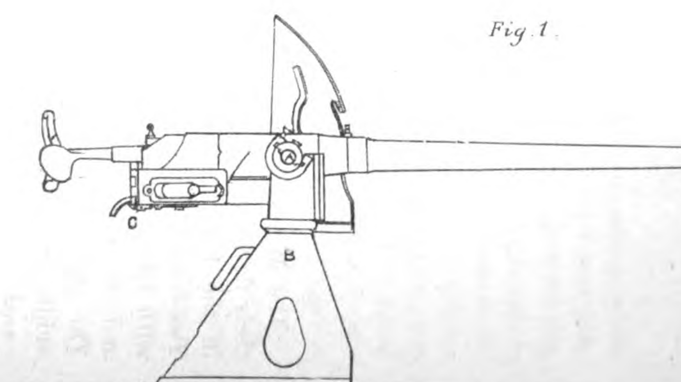


Fig. 1.



MAXIM–NORDENFELT SIX POUNDER QUICK FIRING GUNS.

III.

Quick-firing Guns and Small Arms.*

The Maxim-Nordenfelt Company † showed the progress made in their development of quick-fire guns in the exhibit made by them in the Paris Exhibition. The following may be instanced:—(1) *Two-barrel 1-in. gun on naval carriage*, throwing a 725-oz. projectile with 1500 feet muzzle velocity, intended for the armament of boats and the auxiliary armament of ships to fire at torpedo-boats. (2) *Three-barrel rifle calibre gun on wheeled tripod*, to be carried on pack-saddle or on cavalry carriage. (3) *Five-barrel rifle calibre gun on naval cone*, firing 600 rounds per minute, for sweeping decks, repelling boarders, &c. (4) 6-*pounder light quick-firing guns* (Caponniere), for defence of ditches, fires 36 rounds per minute. (5) 6-*pounder Mark II. gun on recoil-carriage C*, a powerful quick-firing gun for general use. (6) 3-*pounder Mark I. on recoil-carriage B*, fires with initial velocity of 2000 f.s. used for naval service. (7) *Automatic* 1½-*in. gun on cone.* (8) 6-*pounder automatic quick-firing gun on naval mounting*, shown in fig. 1, and further described below. (9) 3-*pounder automatic quick-firing gun on naval mounting.* (10) 14-*pounder quick-firing gun on Mark B carriage*, fires 22 rounds per minute with accuracy and great power. Nordenfelt and Maxim guns.

The 6-pounder quick-firing automatic gun (No. 8 above) see fig. 1, Pl. XIV., embodies the application of the Maxim automatic action to the Nordenfelt 6-pounder, Mark II. It is made from a single block of steel containing main spring, firing pin, &c., and moving vertically. The gun is without trunnions, and fits into a gun-metal cradle. This cradle has trunnions A, which rest in the trunnion boxes of the mounting. A powerful combined hydraulic and spring buffer is attached underneath the cradle, and with the piston-rod of which the gun is connected. In the rear of the cradle is a pistol grip C which

* *List of Authorities.—Engineer*, *Times*, Colonel Slade and Sir F. Abel's papers, Messrs. Schneider, Nordenfelt, Gruson and Hotchkiss, and Delbos.

† See *Engineer*, June 28, 1889, p. 542.

contains the trigger, and on the right side of the cradle is a detachable lever, by the movement of which the breech-block can be lowered or raised. On the side of the cradle is a box which contains a spring mechanism, the action of which works the breech-block and extracts the cartridge case. In firing, the gun recoils in its cradle, compressing the powerful spiral spring round the piston-rod, which then brings back the gun into its firing position in the cradle. The return of the gun acts on mechanism in a side box, which brings down the breech-block with an increasing rate of speed which ejects the cartridge shell. When the next filled cartridge is entered, the breech is closed and secured automatically. Firing may be effected by pulling the trigger when required, or it may be effected directly the breech is secured, by keeping a pressure on the trigger. The ammunition resembles that of other Nordenfelt guns. The gun is mounted on a cone B, with crosshead and pivot. Its rate of firing is believed to be equal to that of the 3-pounder, namely, 60 rounds per minute, or 1 per second continuously.

Hotchkiss guns.*

The Hotchkiss guns were well represented in the Paris Exhibition of 1889. Revolving guns of 37, 47, 53 and 40 mm. being exhibited, also quick-firing guns of 37, 47, 57, 65 and 77 mm., and 10-cm. light and heavy as well as mountain and yacht guns of 42 mm. Messrs. Hotchkiss claim for their system its suitability without modification to the complete range of calibres within the scope of this class of artillery. The details vary only in scale. To know one is to know all. The projectile's weight is in each case four times that of a cast-iron spherical ball of the same calibre. Aiming from the shoulder appears to have been first provided for by Hotchkiss. The 10-cm. (3·9-in.) quick-firing gun on carriage, with limited recoil and automatic recovery with central pivot, is considered able to perforate a plate of 20-cm. (7·9-in.) thick. It fires from 10 to 12 rounds per minute, and a single man can point and fire it as easily as the 57 mm. (2·24-in.) piece. It discharges common shell, steel shell, shrapnel shell, and case-shot.

The rapid-firing gun of 65 mm. (2·57-in.) on recoil carriage and elastic support, presents the ordinary characteristics of the Hotchkiss gun of smaller calibre (fig. 2, Pl. XIV.). For its employment on board ship, it is placed on a carriage of limited recoil, and automatic recovery, similar to that of the pieces of 47 mm. and of 57 mm.; the pivot is placed in the socket of an elastic support; the cannon is thus at such

* See *Engineer*, June 7, p. 478.

a height above the bridge as to be easily manœuvred. The aiming and the firing of this gun, which is held against the shoulder, is performed with as much facility as with the lower calibres; the rapidity of fire is also about the same. The cartridges are arranged in metallic boxes containing eight rounds each; during the firing these boxes are placed on an inclined stand to facilitate the taking out of the ammunition. Besides common and steel shells and case-shot, this gun fires a shrapnel furnished with a double-action fuse; its calibre being sufficient to allow of the effectual employment of this projectile:—

Principal Data.

Gun:—		
Weight of gun		600 kg. or 1,323 lb.
Diameter of bore		65 mm. or 2.57 in.
Length of bore (43 calibres)		2·283 m. or 7·49 ft.
Length of gun		3·025 m. or 9·92 ft.
Ammunition:—		
Common shell	Weight	4 kg. or 8·8 lb.
	Bursting charge	112 gr. or 1,728 grs.
Steel shell	Weight	4 kg. or 8·8 lb.
	Bursting charge	145 gr. or 2,238 grs.
Case shot	Weight	4 kg. or 8·8 lb.
	Number of balls	169
Shrapnel	Weight	4 kg. or 8·8 lb.
	Total No. of fragments	125
	Bursting charge	55 gr. or 849 grs.
Charge	Common shell and steel shell	1,650 gr. or 3·64 lb.
	Shrapnel and case shot	1,450 gr. or 3·20 lb.
Initial velocity of the shell		620 m. or 2,034 ft.
Total weight of cartridge	with shell	7·150 kg. or 15·76 lb.
	with shrapnel and case	6·950 kg. or 15·32 lb.
Total length of cartridge		668 mm. or 26·3 in.
Carriage:—		
Weight of carriage without shield		750 kg. or. 1,653 lb.
Greatest angles of fire	in elevation	+ 15 deg. / − 15 deg.
	in direction	360 deg.
Total weight of gun and carriage		1,350 kg. or 2,976 lb.
Number of rounds per minute		20 rounds.
Thickness of the plate perforated by the steel shell		16 cm.

Gruson's quick-firing guns.

Gruson's system of quick-firing ordnance embraces the following pieces:—3·7-cm. (1·46-in.) gun, 5·3-cm. (2·09-in.) guns of 24 and 30 calibres, and 39 calibres long and 5·7-cm. (2·24-in.) gun, 25 calibres long. All have the same breech mechanism, said to work at the rate of from 35 to 40 rounds per minute.

The projectile of the 5·3-cm. piece weighs 4 lbs., the charge 1·57 lbs.; 26 rounds are fired in one minute, weighing 104·3 lbs. The muzzle velocity of the longest gun is 1969 feet per second, and energy 2804 foot-tons. This piece is intended for naval service. It is

shown in fig. 3, Pl. XIV. A is the gun, B B_1 B_2 show the carriage, C is the pivot plate, D the base of the carriage, and E the cone. There are trunnions on the foresight ring, forming part of the jointed system. The structure is held in front by the recoil press *c*, and in rear by the elevating screw and nut moving in the box *d*. On firing, the gun recoils on the bars B B_1, controlled by the recoil press, and a strong spiral spring *e* forces it back into the firing position. The gun traverses by a lever *f* or by a hand-wheel on the pivot plate C. The mounting is prevented from jumping by a spring bolt. The arms, and levers, and pivot-plate, and moving parts, are cast steel. The cone is of gun-metal, and stand of plate iron; under it is a layer of wood to break the shock of discharge. The weight of the mounting is—upper part, 782·6 lb.; lower part, 771·6 lb. It has 15 degrees arc of elevation and 15 degrees of depression, and trains through the complete circle. It is worked by two men; one lays and fires, and one loads and acts as a substitute.

This is a most formidable gun, and its existence should be noted.

Elswick quick-firing gun. The Elswick 4·724 quick-firing gun is embodied in the armament of the Trafalgar and Nile. Pl. XIV., fig. 4, shows this piece with its steel shield, with the exception that the sloping top of the shield is now to be horizontal and pivoted to the port-sill. The gun weighs 41 cwt., firing a projectile of 45 lbs. with 12 lbs. of smokeless powder, having a muzzle velocity of 2250 foot-seconds and a perforation of 8 inches of iron. The fixed ammunition weighs about 70 lbs. Weight is an important element in quick working.. The rate of firing is about 12 rounds per minute. Higher rates have been obtained, but they are considered of no practical value. Even with smokeless powder, and that of a kind not subject to detonation (conditions not easily secured), 12 rounds per minute is considered the highest rate at which good effect can be got. The breech system was described in the *Naval Annual* for 1887, p. 452.

Colonel Slade on Military Rifles.

Colonel Slade, a member of the Committee on Small-Arms, and recently appointed Commandant of the School of Musketry at Hythe, read a paper on the "Present Position of Small Arms and their Use in the Field," at Aldershot on February 4th. He commenced by

enumerating the magazine arms adopted by the principal Powers, *vide* list herewith.

	Rifle.	Weight.	Calibre.	Magazine.	No. of rounds.
		lb. oz.	in.		
Austria . . .	Mannlicher .	10 2	·315	Fixed box	5
American (Navy) .	Lee . .	..	·433	Detachable	5
Belgium . . .	Mauser . .	9 8	·310	Fixed box	..
China . . .	Lee . .	..	·433	..	5
Denmark . . .	is believed to have adopted the Lee.			..	..
France . . .	Lebel . .	9 4	·315	Tube	8
Germany . . .	Mauser . .	9 8	·310	Fixed box	5
Italy . . .	Vetterli . .	10 10	·409	" "	5
Norway and Sweden .	no definite conclusion yet arrived at.				..
Portugal . . .	Not settled.	..	..	..	..
Russia . . .	" "	..	..	..	..
Spain . . .	Not finally settled.		..	..	..
Switzerland . .	Vetterli . .	10 10	·409	Fixed box	6
Turkey . . .	Mauser . .	..	·433	Tube	8
England . . .	Lee-Mitford .	9 6	·303	Detachable	8

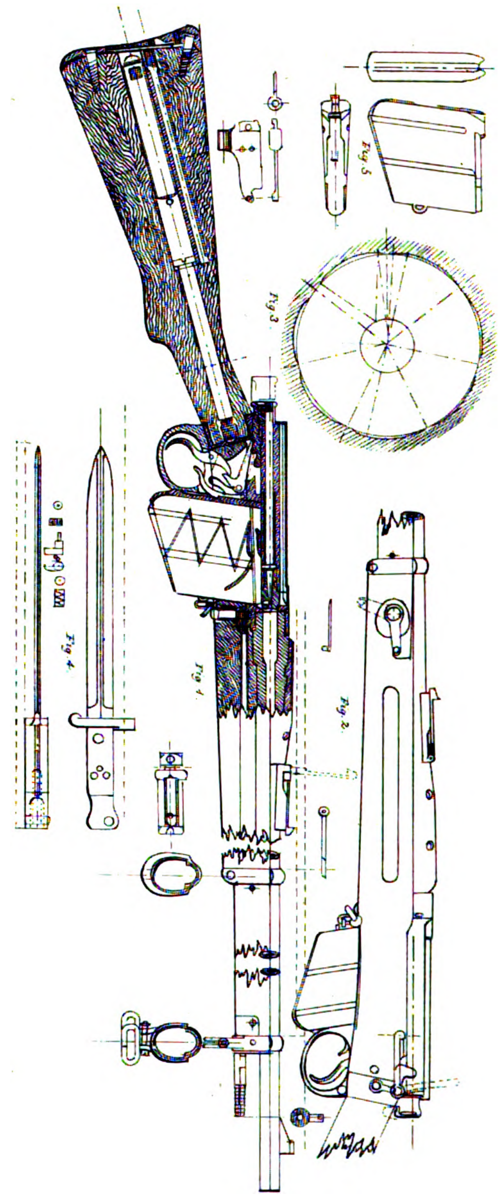
The main features to be considered in connection with the new rifles are the magazine, the reduced calibre, and the introduction of smokeless powder. Colonel Slade dealt with the two first as connected with the introduction of the arm, and the last as having arisen subsequently. As to the magazine, it seems that the fixed steel box has been adopted by all except France, America, and England. France has the tube magazine carrying the rounds under the barrel, with the spiral spring resembling the old Henry repeater. Our own magazine can be replaced by another ready filled, which provides for a rapid supply or the exchange of an injured magazine.

Colonel Slade naturally dwelt on the difficulties that have been experienced with the small bore. The arm was dealt with on the supposition that black powder would be used, and since the appearance of smokeless powder fresh investigations had to be made, and, it is hoped, the question is nearly disposed of now. The absence of smoke, the lecturer said, was a great advantage to a force that was on the defence, but was liable to be a disadvantage in making an attack. Fouling, also, is not an unmixed evil, seeing that it keeps the bullet from stripping and causing metallic fouling, and the barrel from overheating. Various smokeless or nearly smokeless powders were noticed, such as the Duttenhofer made at Rothweil,

which has been now given up in Germany as unstable. Nobel's smokeless powder has been objected to on the same ground. Sir F. Abel's cordite or string powder has borne severe trial as to change of temperature, but trouble has been experienced with it owing to metallic fouling. France and Austria have been said repeatedly to have found a thoroughly satisfactory smokeless powder, but it is doubtful if any one has achieved a complete success, and it might at the present moment be wise to meet any sudden demand for tropical service by the issue of black powder. The difficulties caused by the appearance on the scene of smokeless powder, after the question had been settled with black powder, have been the cause of the complaints sometimes made against the Committee. As to trajectory, the smokeless powder gives some advantage, a muzzle velocity being attained of 2250 feet, instead of 1830 feet, though the actual trajectory is less affected than might be supposed. If aim be taken at a man's breast with the 300-yards sight, he would be struck up to 450 yards if with black powder pellets, and 490 if cordite be used. The rifle has some jump, and throws a little higher than would be expected, which, however, is nearly obviated when fired with the sword or bayonet fixed on the barrel. The lecturer then discussed the question of waste of ammunition, with which most readers are probably familiar. The largest estimate of the number of rounds required by a man in prolonged action is that of General Skobeleff, namely, 130. Occasionally on service it has happened that men have fired away their whole supply, and felt the need of more. At St. Privat the French, having fired away their ninety rounds, had to fall back, no further supply having been sent to them.

As to long-range firing, the lecturer mentioned a case when detachments of men from various regiments made against targets representing four companies standing in quarter columns at 2000 yards, 48 per cent. of hits; at 2400 yards, 29 per cent.; and at 2800 yards, 18 per cent.; and this without previous experience in firing at such long ranges. Heavy losses in the Franco-Prussian and Turko-Russian Wars have been caused by long-range firing even without accuracy. Artillery practice has produced very marked effects up to 5000 range at Oakhampton, and the lecturer argued that for the future great skill will be needed in the manner any advance is made, the present power of fire being terribly manifested in cases of mistakes in tactics; St. Privat, Maiwand, Isandula, and Majuba Hill being quoted. Probably, it was suggested, the Germans are right to recommend that each man should be taught to fight steadily, without reference to what formation he may find adopted, rather than to get

Pl. XV.



used to one in particular, and that generals should keep principles in view, and suit their formation to the occasion. The lecturer referred to an experimental formation tried at Aldershot, in which the men were spread in bodies over the ground in such a way that fire, however random, could hardly miss them. Night operations have been thought likely to be adopted much in future by some officers, and Colonel Slade notices that in Russia and Germany they have been much studied; experiments have been made by us at Hythe and Aldershot, and Tel-el-Kebir affords an example of marked success on service.

As to practical training, a committee assembled at Aldershot in 1885, after investigation, brought out the present "Musketry Instruction, 1887," which is a great advance on the previous regulations. The new arm will no doubt bring about some changes. The accuracy in fire, it has been complained, with trained men may not be greater than with the Martini-Henry, but 115 rounds of the former are carried for the same weight as 70 of the latter, and the power of pouring in nine rounds rapidly at a critical moment is a very valuable element. Recruits will be found to fire better with the new arm, and the sights admit of quicker aim. The new arm is, the lecturer said, a really excellent weapon for service, but it is desirable that men should practise with it under conditions resembling those on active service, as to heavy full pouches and the like.

In the discussion which followed, Lord Wolseley (the Chairman) observed that the increased powers of the new rifle would be manifested mainly at the commencement of an engagement.

New magazine arm.

Figs. 1 to 5, Pl. XV., show the action and various parts of the new magazine arm. The engravings are taken from an official plate by special permission. The rifle is the Lee-Mitford, with a bore of 0·303-in. in diameter. It weighs 9 lb. 6 oz. The action generally resembles the Lee, from which it is taken, described in *Naval Annual*, 1887, p. 461. The magazine, however, is enlarged to contain eight rounds instead of five. It is detachable from the rifle, and is inserted from beneath into a slot or mortise in the stock, and in the shoe in front of the trigger-guard. A magazine catch, just above the front portion of the trigger-guard, engages in a notch in the rear end of the magazine, which is held up by this means and by the projecting point at the top of the front face. The spring shown in the magazine presses up the cartridges into the shoe as fast as they are carried off in succession into the chamber. The point of the bullet of the top cartridge is pressed into the projecting corner above mentioned, holding the cartridges below in their places when the magazine is off the arm. When the magazine is inserted in the

rifle, the withdrawal of the bolt causes the top cartridge to be slightly drawn back, so that it is now free to be fed up into the shoe by the spring. The arm is used as a single-loader or magazine arm, according to whether the magazine is shut off or brought into range of action.

About thirty of these arms are issued to every regiment at home for trial, and are chiefly in the hands of sergeants. The Guards also have been supplied with them. At present powder pellet charges are used, smokeless powder being still experimental.

Sir F. Abel on Smokeless Powder.

Smokeless powder is of so great importance, and Sir Frederick Abel is so high an authority on the subject, that his paper read at the Royal Institution on Friday last (January 31st) deserves special attention, although there was little, if anything, altogether new brought out. The question of what constitutes smoky or smokeless explosion was first dealt with. Smoke may be due to the formation of solid products of explosion, which are carried in a finely divided state in the gas. In ordinary gunpowder these solid products amount by weight to 50 per cent. of the whole. Again, with other smoke-producing explosives, vapour formed is immediately condensed, as in the case of mercuric fulminate or ammonium nitrate in conjunction with charcoal or picric acid. With gun-cotton, on the other hand, which enters into the composition of the best known smokeless explosives, transparent gases and highly-heated water-vapour only are generated. The recent pressing demand for smokeless powder has followed on the introduction of rapid firing arms, whose powers are greatly curtailed by the unavoidable interruption caused by the smoke. To deal with torpedo-boats effectually, or to conduct any rapid fire where aiming is necessary, it is imperative to get rid of smoke. Powders having smokeless explosion are, however, apt to be unstable in their composition. Four years ago smokeless powder of extraordinary power was said to have been introduced with the Lebel rifle in France. It has since transpired, however, that several successive experimental compositions were tried with this rifle. Colonel Schultze, of the Prussian Artillery, has brought in the sporting powder identified with his name, consisting of wood converted into nitro-cellulose. In its best form this closely resembles a granulated nitro-cotton powder made at Stowmarket. Absolute smokelessness was not, however, attained, nor a high degree of accuracy. The smokeless powder of Messrs. Johnson and Borland,

and of the Smokeless Powder Company, are well established compounds in England. Camphor has been used with success to harden the surface and close the pores of the powder granules now used. In French and German smokeless powders, acetic acid and acetone have been used, not merely to harden the tablets or granules, but to convert them into horn-like material. The first powder used with the Lebel rifle took the form of small yellowish brown tablets as thin as stout note-paper. The composition was made a mystery of, but apparently it contained picric acid—the basis of melinite. The powerful and much-vaunted French explosive employed in shells has for its basis picric acid, which was first used by Designolle about twenty years ago. The earliest smokeless French powder undoubtedly failed in the quality of stability, and has been superseded by a simpler compound. German powder of great promise, elaborated at the Rothweil Powder Works, failed from the same defect of instability. Mr. Alfred Nobel, the inventor of dynamite and other powerful blasting agents depending on nitro-glycerine for their basis, also makes smokeless powder based on gun-cotton in the above form, bearing considerable resemblance to his blasting gelatine. Colonel Hess, in Austria, rendered this substance less susceptible to accidental explosion by the incorporation of camphor previously used in the manufacture of the curious substitutes for ivory, horn, &c., known as xylonite. Mr. Nobel has had some success in Italy with his smokeless powder, with which Krupp is also said to be experimenting. The Government Committee on Explosives have used Nobel's powder and others in the form of wires and rods in bundles, in small arms, with excellent results. The most promising of them, besides fulfilling the conditions of smokelessness and stability, has developed much greater energy in small-bore arms. Considerable erosive action is effected, and the arm is heated, while but little fouling is produced. Success with small arms seems on the eve of attainment with smokeless powder, and its application to larger barrels of from 1·85-in. to 6-in. in calibre is attended with less difficulty. Probably the form of the gun will need modification, the pressure in the chamber being less and in the bore greater than with black powder. In our service the need for resisting climatic action of all kinds involves unusually great difficulties, and modifications in our system of magazines may be necessary.

As to the effect on operations of war, much licence has been given to the imagination as to results arising from the use of powder from which noise as well as smoke has been eliminated. This has no foundation, the noise of smokeless powder differing only from that of

black powder by being rather sharper and of shorter duration. German field guns and our own experimental pieces are fired with powder generating a very slight smoke, like the puff of a cigar, which is instantly dissipated. Independent rifle-firing is not visible at 300 mètres distance. The main effect in battle will be to increase the elements of calculation, leaving less to chance.

M. Delbos states that *melinite* consists of equal parts of picrate of potash and chlorate of potash. *Poudre dessignole* specially used in the French Navy, consists of picrate of potash, saltpetre and charcoal.

Poudre verte, a new powder of great power, consists of picrate of potash, 14 parts by weight, picric acid, 4 parts, and prussiate of potash, 3 parts.

Present state of powder.

With regard to powder, the position of matters at present is as follows:—

Old-type guns generally fire the classes of powder so long used with them, except the 12·5-inch 38-ton gun, for which the powder known as "E. X. E." is used. The new-type B.L. guns fire "E. X. E" powder up to the 9·2 inch inclusive. For the 10-inch B.L., the "Prism Brown" powder is used, but this is being superseded by the slow-burning cocoa ("S. B. C.") powder, which is used for the larger new-type guns. For quick-firing guns, Q.F. cube powder is employed. As to the future, to obtain the benefits of quick-firing, powder should be if possible smokeless, and not liable to detonation. "Amide" powder, consisting of 18 per cent. charcoal, 3 per cent. sulphur, and 79 per cent. of nitrates of potash and ammonia, made by the Chilworth Company, fulfils these conditions, but it is objected to as unstable. "Cordite," believed to be nearly akin to Nobel's patented powder, which consists of nitrated cotton and nitro-glycerine, promises well. It is smokeless and keeps well. It has shown great resistance to detonation, but some doubts are expressed by some authorities on this head. For small arms, compressed pellets of 70 grains are used at present, but some smokeless powder, perhaps cordite, may come in.

Tables of British and Foreign Guns.

NOTE.—The greater part of the following Tables have been taken from the *Austrian Marine Almanack* for 1890. The *Manuel du Cannonier* has also been consulted.

Energies and Perforations are calculated afresh.

The British Table is the official one previously used corrected up to date.

A few notes have been added to the Russian Table.

BRITISH RIFLED ORDNANCE.

(Chiefly founded on the official "List of Service Rifled Ordnance, 1888," corrected up to date.)

Ordnance: Nature				Ordnance		Chamber			Rifling: Twist one turn in			Rifling	Charge (full)	Projectile					Ballistics (with full charges)		Perforation of wrought iron		
	Calibre or Pr.	Weight.	Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Capacity.	Least at breech.	Greatest at muzzle.	Distance at muzzle twist is uniform.	System.*	Weight.†	Diameter.	Weight.‡	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.
					calbs.	ins.	ins.	cub. ins.	cals.	cals.	ins.		lbs.	ins.	lbs. ozs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.
B.L. Guns (new type).	16·25-in.	111 tons.	I. S.	524·0	30·0	21·125	84·5	28,660	130	30	77·3	P.	960 S.B.C. 850 WBPr.	16·25	1800 0	0·146	0·421	2104 2148	55,250 57,580	498 518·8	34·5 35·2	.. 32	.. 29
	13·5-in.	67 tons.	I. II. III. S.§	433·0	30·0	18·0	66·5	17,100	120	30	131·0	P.M.B.	630 S.B.C.	13·5	1250 0	..	..	2025	35,560	530·7	30·4	28	26
	12-in.	45 tons. 44 tons.	IV. V. S. III.	328·5	25·13	16·0	48·0	9,666	120	35	125·5	P.M.B.	295 Pr.[1]B.	12·0	714 0	0·202	0·413	1892	18,060	420·1	22·5	20·6	18·8
	10-in.	29 tons.	II. III.	320·0	32·0	14·0	54·0	8,370	120	30	166·7	P.M.B.	250 Pr.[1]B.	10·0	500 0	..	..	2100‖	15,290	527	23	21·0	19
	9·2-in.	21 & 22 tns.	I. II. S.	250·8	25·0	11·0	44·0	4,300	120	35	76·1	P.M.B.	144 Pr.[1]B.	9·2	380 0	..	..	1809	8,622	411 392	18·0	17	15
	9·2-in.	24 & 22 tns.	III. V. VI. S.	310·0	28·4	12·0	43·0	5,000	120	30	120·4	P.M.B.	170 Pr.[1]B.	9·2	380 0	0·238	0·477	2065	11,230	511·1	20·3	19	17
	8-in.	14 tons.	VI. S.¶	254·5	29·6	10·5	38·0	3,350	120	35	96·1	P.M.B.	125 Pr.[1]B.	8·0	210 0	0·305	0·410	2200‖	7,060	508·2	17·4	16	14
	6-in.	5 tons.	IV. & VI. S.	173·5	26·0	8·0	26·75	1,380	120	35	61·75	P.M.B.	42 Pb.[2]	6·0	100 0	0·360	0·433	1960	2,665	533	12·5	10·0	8·0
	5-in.	40 cwt.**	III. & IV. S.	139·5	25·06	5·75	19·05	504	120	25	51·8	P.M.B.	16 S.Pb.	5·0	50 0	0·500	0·400	1800	1,123	561	9	7	5
	4-in.	26 cwt.	IV. & V. S.	120·0	27·0	5·3	18·5	417	120	30	43·77	P.M.B.	12 S.Pb.	4·0	25 0	0·640	0·391	1900	625·1	500·8	7·3	6	5
	4-in.	13 cwt.	I. S.	66·0	14·81	4·5	8·12	126·5	116	35	11·39	P.M.B.	3¼ R.L.G[2].	4·0	25 0	0·640	0·391	1180	242	372	4	3·4	3·0
	12-pr.	7 cwt.	I. L.	92·3	28·0	3·625	11·0	117	120	28	35·8	P.M.B.	4 S.Pb.	3·0	12 2	0·720	0·463	1730	252	720	..	..	..
M.L. Guns.	17·72-in.	100 tons.	I. L.	391·8	20·43	19·7	59·72	16,957	150	50	2·88	P.M.M.	450 Pr[1] or [2]B	17·72	1968 0	0·159	0·374	1548	32,710	327	24·5	23	21
	16-in.	80 tons.	I. S. & L.	321·0	18·0	18·0	59·6	14,600	0	50	0	P.M.M.	450 Pr.[1]B.	16·0	1684 0	0·152	0·411	1590	29,530	369	25	23	22
	12·5-in.	38 tons.	II. S. & L.	230·0	15·84	14·0	41·125	6,000	438	35	0	W.	210 Pr.[2] or Pr.[1] black 190	12·5	809 12½	0·193	0·415	1575	13,930	366·6	19·4	18	16
	12-in.	35 tons.	I. S. & L.	195·0	13·54	Unchambered			0	35	0	W.	140 Pb.[2]	12·0	706 12	0·204	0·409	1390	9,469	250·5	16	15	13
	12-in.	25 tons.	II. S. & L.	182·5	12·09	"			100	50	0	W.	85 Pb.[2]	12·0	608 12	0·237	0·352	1288	7,006	281·8	13·5	12	11
	11-in.	25 tons.	II. S. & L.	180·0	12·09	"			0	35	0	W.	85 Pb.	11·0	543 14	0·223	0·408	1314	6,561	262·4	15·6	14	13
	10-in.	18 tons.	II. S. & L.	180·0	14·55	"			100	40	0	W.	70 Pb.	10·0	406 9	0·246	0·406	1379	5,360	297·5	13	12	10

M.L. Guns.	9-in.	12 tons.	V. S. & L.	156·0	13·88	Unchambered.			0	45	0	W.	50 Pb.	9·0	253	9	0·320	0·347	1440	3,695	304	11·7	10	9
	9-in.††	12 tons.	VI. S.	156·0					100	35	81	P.	..	9·0	..		..	..	..	..	..	..	..	..
	8-in.	9 tons.	III. S.	144·0	14·75	„			0	40	0	W.	35 Pb.	7·92	174	12	0·359	0·352	1384	2,391	258	9·6	8	7.
	7-in.	90 cwt.	I. S.	131·0	15·88	„			35	35	All	W.	22 Pb.	6·92	112	1	0·427	0·338	1325	1,400	303	8	7	6
	7-in.	6½ tons.	III. S. & L.	133·0	15·88	„			35	35	All	W.	30 Pb.	6·92	112	1	..	..	1525	1,805	278	9·3	8	6
	7-in.	7 tons.	IV. L.	148·0	18·0	„			35	35	All	W.	30 Pb.	6·92	112	1	0·427	0·338	1561	1,892	270	9·6	8	6
	6·6-in.	70 cwt.	I. L.	118·0	14·78	6·8	21·0	709	100	35	13·2	P.M.M.	25 Pb.	6·6	97	12	0·446	0·340	1416	1,358	388	..	..	..
	64-pr.	64 cwt.	I. II. L.	I. 120·0 II. 119·5	15·55	Unchambered.			40	40	All	Pl.	6½ R.L.G.[4]	6·28	64	8	0·588	0·271	1125	565	177	..	..	..
	64-pr.	64 cwt.	III. S. & L.	118·0	15·55	„			40	40	All	Pl.	10 R.L.G.[4]	6·28	64	8	0·588	0·271	1390	897	270	..	..	..
	40-pr.	35 cwt.	II. L.	120·0	22·0	„			35	35	All	W.	6¾ R.L.G.[4]	4·75	39	8½	0·552	0·382	1415	548	313	..	..	..
	25-pr.	18 cwt.	I. L.	98·0	22·0	„			35	35	All	W.	4½ R.L.G.[4]	3·94	24	15	0·605	0·420	1363	322	358	..	..	..
	16-pr.	12 cwt.	I. L.	78·0	19·0	„			30	30	All	F.M.	3 3/16 R.L.G.[2]	3·54	16	1½	0·771	0·366	1355	199	332·7	..	..	..
	15-pr.	422 lbs.	I. L.‡‡	70·5	20·0	3·2 (decreased)			60	20	24	M.M.	..	3·3	15·0		..	..	1040	113	..	..	..	..
	13-pr.	8 cwt.	I. L.	92·1	28·0	3·15	14·13	109	100	30	9·0	P.M.M.	3¼ R.L.G.[4]	3·0	13	0¼	0·689	0·484	1596	229	572	..	..	..
	9-pr.	6 cwt.	II.III.S.&L. I. II. III. IV. S. & L.	74·5 72·0	22·0 21·17	Unchambered.			30	30	All	F.M.	1¾ R.L.G.[2] and 1½ R.L.G.[2]	2·94	9	0	0·946	0·359	1330	119	403	..	..	..
	2·5-in.	400 lbs.	I. L.	70·45	26·6	2·56	11·07	54	80	30	3·53	P.M.M.	1½ R.L.G.[2]	2·5	7	4	0·893	0·448	1440	101	566	..	..	..
	7-pr.	200 lbs.	IV. S. & L.	41·0	12·0	Unchambered.			20	20	All	F.	¾ R.F.G.	2·94	7	5¼	1·181	0·288	950	46	515	..	..	..
R.B.L. guns (screw).	7-in.	82 cwt.	S. & L.	120·0	14·21	7·2	16·0	620·0	37	37	All	P.	11 R.L.G.[3]	7·0	109	0	0·450	0·318	1100	915	223	..	..	..
	40-pr.	35 cwt.	S. & L.	121·0	22·39	4·96	13·5	257·8	36½	36½	All	P.	5 R.L.G.[3]	4·75	40	9	0·562	0·374	1180	391	223	..	..	..
	20-pr.	16 cwt.	L.	96·0	22·4	3·94	12·0	143·0	38	38	All	P.	2½	3·75	22	1½	0·645	0·414	1130	196	245	..	..	..
		15&13cwt.	S.	66·125	14·43	3·94	11·0	131·0	38	38	All	P.	2½ R.L.G.[3]	3·75	22	1½	0·645	0·414	1100	186	248	..	..	..
	12-pr.	8 cwt.	S. & L.	72·0	20·458	3·2	8·5	66·0	38	38	All	P.	1½ or	3·0	11	4	0·800	0·417	1239	120	283	..	..	..
	9-pr.	6 cwt.	S. & L.	62·0	17·5	3·2	7·0	55·1	38	38	All	P.	1⅛ R.L.G.	3·0	8	8½	1·059	0·315	1055	66	220	..	..	..
	6-pr.	3 cwt.	S. & L.	60·125	21·2	2·625	7·0	37·9	30	30	All	P.	¾		5	15			1046	45	300			
Quick Firing Guns.																						Mild steel plate.		
Hotchkiss	6-pr.	8 cwt.	S.	97·63		..	..	..	..	..	..	..	1 15½	2·24	6	0	0·844	0·527	1820	137·8	344·5	3·2	2·0	..
Nordenfelt	6-pr.	6 cwt.	I. & II. S.	104·4		..	..	..	0	26	0	..	1 15½	2·25	6	0	0·844	0·527	1860	143·9	479·6	3·3	2·1	..
Hotchkiss	3-pr.	4 cwt.	S.	80·63		..	..	..	25	25	All	..	1 8	1·85	3	8	0·978	0·553	1873	77·6	485·5	2·9	1·8	..
Ordnance Q.F.	4·7 in.	2 tons.	S.	194·1		..	..	..	100	34·4	30	P.	..	..	..		..	..	..	..	..	..	..	..
Machine Guns.													grains.		oz.	grs.								
Nordenfelt, 4 bar.	1-in.	447 lbs.	III. S.			..	..	..	35	35	All	H.	625	1·0	7¼	0	2·207	0·453	..	..	..	¼-in. at 200 yards.		
Gatling, 10 bar	0·65-in.	787 lbs.	S. & L.			..	..	..	46·5	46·5	All	H.	270	0·65	0	1422	2·109	0·730	..	..	..	Not known.		
Gardner, 2 bar	0·45-in.	131 lbs.	S. & L.			..	..	..	22·0	22·0	All	H.	85	0·450		480	2·952	0·751	..	..	..	Same as M.H. bullet.		

S., Sea-service gun; L., Land-service. The Roman numeral is the number of the pattern given.

* P means Polygroove; M.M., Maitland muzzle-loading, and M.B., Maitland breech-loading; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry. † S.B.C. (in column for charge) means Slow-burning Cocoa; W.B.Pr., Westphalian Brown Prism; P.B. stands for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain. ‡ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. § Further differences in pattern indicated by letters A, B, and C. ‖ Estimated. ¶ Patterns Marks III., IV., and V. differ from VI. chiefly in length, weight, and muzzle velocity. ** There is an 80-pr. Elswick gun of 81 cwt. mounted on H.M.S. Rover, also 4 in Mark I. of 22 cwt., and II. and III. of 23 cwt. †† For high-angle fire. ‡‡ Mountain-service jointed gun.

AUSTRIAN NAVAL ORDNANCE.

	Krupp Steel B.L. Guns.												Uchatius. St., Br.					Cast Iron BL.
Designation by Calibre, in centimètres	30·5	28 L. 22	26 L. 22	24 L. 35 C. 86	24 L. 35 C. 86	24 L. 22	21 L. 20	15 L. 35 C. 86	15 L. 35 C. 80	15 L. 26	15 L. 26	12 L. 35 C. 80	15 L. 25	15 L. 37	12 L. 35	9 L. 24	7 L. 15	15 L. 21
Calibre, in inches	12·01	11·02	10·24	9·45	9·27	9·27	8·24	5·87	5·87	5·87	5·87	4·72	5·87	4·72	4·72	3·43	2·60	5·87
Length: Total, in Feet	35·11	20·01	18·77	27·60	17·16	15·45	13·73	17·13	17·13	12·63	12·63	13·8	12·19	14·38	13·97	6·76	3·28	10·13
Length: Rifled Portion, in inches	314·8	169·8	148·4	233·2	135·9	115·3	105·0	151·4	149·6	105·7	111·6	128·5	111·4	123·2	123·8	57·5	23·8	89·8
Length: Powder Chamber "	69·9	37·4	46·1	69·3	41·7	41·7	37·0	37·8	35·4	29·3	23·4	24·0	23·6	36·6	31·65	16·5	11·0	18·0
Length: Of bore in calibres	35	18·8	19·0	35	19·2	16·9	17·2	35	31·5	23·0	23·0	32·0	23·0	37	32·9	21·6	13·4	18·4
No. of Grooves	68	64	32	..	32	32	30	36	36	24	36	32	36	32	32	24	18	30
Twist in calibres	..	45	70	26·9	70	64·7	59	45—25	25	68·4	45	25	45	45—25	25	45	30	63·2
Weight: Gun, including Breech Gear, tons	47·8	27·1	21·7	..	14·6	14·5	8·68	5·7	4·69	3·94	3·94	2·25	3·35	3·2	2·85	0·479	0·09	2·81
Weight: Breech Block, in lbs.	..	2315	1951	..	1411	1422	1080	..	..	321·9	321·9	..	209·4	..	211·6	55·1	18·7	176·4
Weight: Steel Shell "	1003·1	557·8	395·7	..	292·1	292·1	206·6	112·5	86·0	72·8	84·9	57·3	84·9	57·3	57·3	..	..	..
Weight: Chilled Shell "	..	..	..	..	..	308·6	196·2	..	..	..	..	..	..	..	..	..	..	..
Weight: Common Shell "	1003·1	488·3	354·2	..	263·5	263·5	172·0	112·5	69·9	67·2 / 65·5	69·4	57·3	69·45	57·3	57·3	14·02 / 14·22	6·42	6·11
Weight: Shrapnel Shell "	..	..	..	..	..	..	..	112·5	71·9	67·2 / 65·5	69·4	57·3	69·45	57·3	57·3	15·76	6·88	6·79
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·53	6·94	38·4
Weight of Bursting Charge: Steel Shell "	..	14·3	8·8	..	6·6	6·6	4·4	..	1·76	1·65	2·09	0·55	2·09	0·53	0·55	..	..	..
Weight of Bursting Charge: Chilled Shell "	..	..	..	..	..	3·75	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell "	..	18·7	20·3	..	15·0	15·0	15·0	..	3·86	3·86	5·07	3·53	5·07	2·20	2·21	0·46	0·18	1·87
Weight of Bursting Charge: Shrapnel Shell "	..	..	..	..	..	..	..	..	1·10	1·08	1·08	0·57	1·08	0·57	0·57	0·20	0·09	0·90
Weight of Firing Charge: Steel and Chilled Projectile, in lbs.	..	123·5*	89·3 B	..	76·1 B	52·9	50·7 C	..	38·8	21·6 C	20·9 C	19·8 B	20·9 C	30·0 B	19·8 Br	..	.	..
Weight of Firing Charge: Service, in lbs.	..	123·5*	59·5	..	44·1	44·1	30·9	..	38·8	14·3 / 21·6	20·9 C	19·8 B	20·9 C	30·0 B	19·8 B	3·31 / 0·97	0·77 O / 0·35	4·74
Weight of Firing Charge: Exercising "	..	68·3	59·5	..	44·1	44·1	30·9	..	19·6	21·6 C	20·9 C	11·0	20·9 C	19·8 B	12·13 B	8·31	0·77 O / 0·35	4·74
Weight of Firing Charge: Saluting "	..	19·8 O	19·8 O	..	15·4 O	15·4 O	8·82 O	..	4·74 O	4·74 O	4·74 O	..	4·74 O	..	..	0·88 O	0·35	4·74
Muzzle Velocity, in feet	1755·3	1568	1575	..	1421	1378 / 1345	1519	..	1969	1641	1562	1738	1562	1942·3	1755	1470	978	1017
Muzzle Energy: Total, foot tons	21,420	9513	6808	..	4087	3847	3306	..	2312	1358	1435	1201	1435	1499	1224	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	567·8	270·4	211·6	..	140·4	132·1	127·7	..	125·4	73·7	77·9	81·0	77·9	101·1	82·45	..	..	..
Thickness of Iron, perforated inches at Muzzle	24·8	17·0	15·0	..	12·1	11·7	11·6	..	11·7	8·8	9·1	9·4	9·1	10·54	9·45	..	..	..

NOTE.—P stands for pebble powder; C for cube powder; * prismatic powder; O ordinary powder (inferior); B brown prismatic.

DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.										Armstrong M.L.						Finspong.
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm. short.	8·6 cm.	10 in.	10 in.	10 in.	9 in.	8 in.	8 in.	6 in.
Calibre, in inches	13·98	12·01	10·24	10·24	5·91	5·91	5·91	4·72	4·72	3·43	10·0	10 in.	10 in.	9·0	8·0	8 in.	6·04
Total length, in feet	29·1	22·0	32·8	18·77	17·1	12·63	10·7	11·8	9·6	6·9	17·0	14·5	14·0	13·0	10·8	10·8	9·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	190·3	135·0	112·9	128·8	102·4	73·6	175·5	145·5	140·0	125·0	104·2	104·2	100·8
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	32·2	22·8	19·1	27·3	21·7	21·3	17·5	14·55	14·0	13·3	13·1	13·1	16·7
Number of Grooves	80	68	60	60	36	36	36	32	32	24	7	7	7	6	6	6	6
Twist of Rifling, in calibres	45	45	70·25	45	70·25	45	45	25	40	45	40	40	40	40	50	50	40
Total weight, including Breech-gear, tons	51·2	35·4	27·6	21·5	4·6	3·9	3·5	2·13	1·36	0·49	20·0	18·5	18·0	12·5	8·65	7·04	2·46
Weight of Breech Block, lbs.	4695·8	2910	1982	1940	390·2	330·7	324·1	229·2	176·4	101·4	..	..	..	..	..	..	..
Weight of Steel Shell, „	1157·4	725·3	451·9	451·9	112·4	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Chilled Shell, „	1157·4	725·3	..	451·9	..	86·0	86·0	..	44·1	..	400	400	400	250·2	165·3	..	..
Weight of Common Shell, „	1157·4	621·7	451·9	391·3	112·4	69·4	69·4	57·3	36·2	14·3	400	400	400	250·2	131·2	..	55·1
Weight of Shrapnel Shell, „	..	..	..	..	..	..	..	..	..	..	..	..	..	..	149·9	..	15·4
Weight of Case Shot, „	..	..	..	..	..	..	..	..	..	..	191·8	..	..	154·3	127·9	..	58·4
Weight of Bursting Charge: Steel Shell, „	27·6	18·5	11·5	11·5	2·2	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Chilled Shell, „	..	9·9	..	6·0	..	1·1	..	..	0·55	..	4·4	4·4	4·4	..	..	..	..
Weight of Bursting Charge: Common Shell, „	33·5	32·6	23·1	20·9	5·62	4·2	4·19	1·21	2·4	0·44	26·5	26·5	26·5	18·5	7·5	7·5	5·0
Weight of Firing Charge: Steel or Chilled Shell, lbs.	297·6	158·7	191·8	99·2	40·8	18·7	22·0	..	8·8	..	69·4	69·4	69·4	43·0	29·8	29·8	..
Weight of Firing Charge: Common Shell, „	297·6	158·7	191·8	99·2	40·8	18·7	22·0	18·2	8·8	3·3	69·4	69·4	69·4	34·2	19·8	19·8	60·6
Muzzle Velocity: Armour-piercing Projectile, feet	1619	1558	2064	1558	1789	1562	1542	..	1416	..	1457	1404	1388	1368	1378	1378	..
Muzzle Velocity: Common Shell, „	1619	1673	2064	1673	1789	1683	1690	..	1549	1457	1457	1404	1388	1214	1230	1230	1076
Muzzle Energy: Total foot-tons	20970	12200	13550	7605	2494	1455	1418	..	6130	..	5889	5467	5347	3244	2177	2177	..
Muzzle Energy: Per inch circumference, foot tons	477·5	323·5	421·4	236·4	134·4	78·4	73·0	..	32·8	..	189·0	175·3	171·6	115·8	86·9	86·9	..
Perforation at Muzzle, in inches	22·5	18·56	21·5	15·86	12·1	9·1	8·8	..	5·8	..	14·1	13·5	13·3	11·0	9·5	9·5	..

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading.					Armstrong Muzzle Loading.			Dutch Breech Loading.		
Designation by Calibre, in centimètres	28	21	17	15	12 No. 1.	28	23	18	12 No. 2.	12 No. 3.	7·5
Calibre, in inches	11·02	7·91	6·80	5·87	4·72	11·00	9·00	7·00	4·72	4·72	2·95
Total Length, in feet	20·01	24·04	13·94	12·63	6·89	14·42	13·00	11·00	6·89	6·89	7·87
Length of Rifled Portion of bore, in inches	170·8	222·2	112·7	111·8	61·4	119·0	104·0	95·5	61·4	61·4	43·2
Length of Powder Chamber "	36·4	42·4	36·0	23·2	13·0	26·0	21·9	15·5	13·0	13·0	6·7
Length of bore, in Calibres	18·8	35	21·9	23·0	15·8	12·1	14·0	15·9	15·8	15·8	17·5
Number of Grooves	64	48	42	36	12	9	6	3	12		20
Depth of Grooves, inches	0·069	0·59	0·118	0·118	0·492	2·000	1·80	1·80	0·118		0·019
Twist of Rifling in Calibres	45	∝ 25	45	40	40	∝ 45	∝ 45	35	40	40	∝ 30
Total Weight, in tons	27·21	12·79	5·51	3·94	0·79	24·46	12·50	7·17	0·93	0·90	0·21
Firing Charge — Armour Piercing Projectile, in lbs.	121·3	99·2	27·6	20·9	..	86·0	50·7	30·0			..
Firing Charge — Common Shell "	121·3	99·2	27·6	20·9	2·43	86·0	50·7	13·9	2·43		0·82
Weight — Armour-piercing Projectile "	560·0	308·6	132·3	86·0	41·0	533·5	249·1	114·6	..		..
Weight — Common Shell "	476·2	308·6	112·4	69·4	29·5	535·7	262·4	116·8	29·5		9·5
Weight — Case Shot "	273·4	..	63·9	41·9	26·5	185·2	149·9	68·3	26·5		9·3
Bursting Charge — Armour-piercing Projectile "	6·6	4·6	2·2	1·1	0·44	4·4	2·2	2·2	..		..
Bursting Charge — Common Shell "	26·5	12·3	6·6	6·6	2·0	28·7	17·6	8·8	1·8		0·44
Muzzle Velocity, feet	1558	1739	1558	1558	971	1332	1476	1558	951		958
Muzzle Energy — Total, in foot-tons	9423	6471	2226	1447	..	6563	3763	1929	..		..
Muzzle Energy — Per inch Circumference, foot-tons	272	260·7	104	84	..	191	134	89	..		..
Perforation at Muzzle, in inches	17·0	16·8	10·5	9·1	..	14·0	11·9	9·7	..		..
Metal employed or system of construction	Steel Jacket and Hoops.		Steel-hooped.			Steel Tube and Wrought Iron.			Bronze.		

NOTE.—The 23-cm. guns also discharge 113-Kg. steel shells and 113-Kg. solid shells. The 18-cm. guns discharge steel shells of 51-Kg. and segment shells of 53-Kg. The 7·5-cm. guns discharge ring-shells of 4·3 Kg. Of the older guns there are yet extant three sorts—rifled 16-cm. muzzle-loader (mostly bronze), rifled bronze 7-cm. and 5-cm.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	1870–81.	70–81. 70–84.	81–84.	1884.				1881.									
Desig. by Calibre, in cms.	27	32	14	34	27	24	16	34 long.	34 short.	27	24	16 heavy.	16 light.	14	10	mm. 90	mm. 65
Calibre, in inches	10·80	12·6	5·46	13·39	10·80	9·45	6·49	13·39	13·39	10·8	9·45	6·49	6·49	5·46	3·94	3·54	2·57
Total length, in feet	23·97	28·01	13·64	..	28·47	24·89	17·04	33·69	25·32	27·12	23·70	15·14	15·14	14·3	8·6	7·1	3·58
Length of Bore, in inches	269·0	313·8	..	..	..	..	..	380·6	280·2	306 9	269·3	180·9	180·9	162·6	102·6	77·9	41·2
Length of Bore, in calibres	24·9	24·9	..	..	..	..	..	28·4	21·0	28·5	28·5	28·5	28·5	30	26	22	16
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	50	50	42	30	28	20
Depth of Grooves, inches	0·059	0·059	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035	0·028	0·024	0·020
Rifling Twist	70	70	..	..	..	..	..	70	70	70	70	7°	7°	7°	7°	7°	8°
Total weight, in tons	24·6	41·3	32·0	53·1	27·6	2·26	5·41	52·2	47·2	27·4	17·7	4·9	3·9	3·2	1·18	0·54	0·09
Weight of Firing Charge { Armour Piercing Projectile . . lbs.	203·9	249·1	27·1	..	203·9	..	42·5	..	337·3	203·9	150·1	42·5	32·6	..	..	..	..
Weight of Firing Charge { Common Shell „	203·9	249·1	27·1	..	203·9	..	42·5	..	337·3	203·9	150·1	42·5	32·6	27·1	9·9	3·6	0·95
Weight { Armour Piercing Projectile . . lbs.	476·2	760·6	66·14	925·9	476·2	317·5	99·2	925·9	925·9	476·2	317·5	99·2	99·2	..	..	..	..
Weight { Common Shell . „	396·8	630·5	66·14	771·6	396·8	264·6	99·2	771·6	771·6	396·8	264·6	99·2	99·2	66·1	30·9	17·6	5·95
Weight { Case Shot . „	..	..	..	..	..	..	..	..	..	..	..	..	..	61·7	39·0	19·5	7·7
Muzzle Velocity, in feet, sec.	..	1804	1936	2133	2067	2067	2001	2067	1804	2034	2034	1969	1821	1936	1673	1493	1135
Muzzle Energy { Total, in foot-tons	..	17160	1719	29180	14110	9410	2754	27440	20880	13660	9107	2668	2080	..	..	..	..
Muzzle Energy { Per in. circ., foot-tons	..	433·5	100·2	693·7	397·3	317·1	135·1	652·2	496·6	402·6	308·4	130·9	121·3	..	..	..	..
Perforation at Muzzle, inches	..	21·71	10·5	27·62	20·9	18·7	12·2	26·8	23·2	21·38	18·4	12·0	11·5	..	..	..	..

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	75–79.	Jacketed. 1870.			Jacketed. 70–75	Jacketed. 75	1875.					1870.					
Desig. by Calibre, in cms.	37	32	27	14	27 No. 1	10	42	34	27 No. 1	27 No. 2	10	32 long.	27	24	19 long.	16	14
Calibre, in inches	14·57	12·6	10·79	5·46	10·8	3·94	16·54	13·39	10·8	10·8	3·91	12·6	10·8	9·45	7·64	6·49	5·46
Total length, in feet	36·7	22·0	17·7	10·3	19·3	9·3	32·5	22	19·3	19·3	9·3	22·0	17·7	16·21	13·6	12·2	10·3
Length of Bore, in inches	414·0	243·6	194·3	115·0	213·4	104·3	366·0	241·5	213·4	214·8	104·3	243·6	194·3	179·1	151·0	137·3	115·0
Length of Bore, in calibres	28·4	19·5	18	21·1	19·8	26·5	22·1	18	19·8	19·9	26·5	19·5	18·0	18·1	19·8	21·2	21·1
Number of Grooves	..	64	54	28	54	20	84	68	54	42	20	64	54	48	28	50	28
Depth of Grooves, inches	0·079	0·059	0·059	0·047	0·059	0·032	0·079	0·059	0·059	0·059	0·032	0·059	0·059	0·059	0·059	0·039	0·047
Rifling Twist	7°	4°	4°	4°	4°	7°	7°	4°	4°	4°	7°	4°	4°	4°	4°	7°	4°
Total weight, in tons	75·1	38·8	22·8	2·6	27·9	1·18	74·8	47·6	27·6	24·4	1·18	38·4	22·8	15·4	7·9	4·92	2·66
Weight of Firing Charge: Armour Piercing Projectile, lbs.	463	189·6	136·7	..	165·3	..	604·1	257·9	136·7	103·6	..	151·0	92·6	62·8	33·1	39·7	..
Weight of Firing Charge: Common Shell, "	463	196·2	126·8	13·6	145·5	10·1	..	231·5	121·3	103·6	7·1	151·0	92·6	62·8	33·1	39·7	9·0
Weight: Armour Piercing Projectile, lbs.	1235	760·6	476·2	..	476·2	..	1719·6	925·9	476·2	476·2	..	760·6	476·2	317·5	165·3	99·2	..
Weight: Common Shell, "	1014	631·6	396·8	61·7	396·8	30·9	1433·0	771·6	396·8	396·8	26·3	631·6	396·8	264·6	137·8	99·2	46·3
Weight: Case Shot, "	..	..	321·9	42·8	321·9	18·7	..	..	321·9	321·9	18·7	..	321·9	211·6	..	68·3	39·7
Muzzle Velocity, in feet, sec.	1969	1543	1575	1529	1736	1673	1739	1595	1641	1542	1591	1437	1424	1444	1470	1782	1493
Muzzle Energy: Total, in foot-tons	33210	12590	8193	..	9942	..	36040	16320	8865	7852	..	10880	6695	4592	2477	2183	..
Muzzle Energy: Per in. circ., foot-tons	725·4	318	242	..	293	..	695·5	388	261	231·5	..	275	197·3	154·7	103·2	107	..
Perforation at Muzzle, inches	28·2	18·3	16·0	..	17·8	..	27·4	20·3	16·7	15·6	..	16·9	20·53	20·3	10·4	10·8	..

GERMAN NAVAL ORDNANCE.

	Krupp Steel Breech-loading Guns, designated by calibre.																								Bronze B.L.
Designation in centimètres	30·5 jack'd.	26 long.	26 jack'd.	26 short.	24 long.	24 short.	21 long.	21 long.	21 short.	21 short.	17 long.	17 short.	15 long.	15 short jack'd.	15 short.	15 short.	15 short jack'd.	15 short jack'd.	12·5 hoop'd.	12 hoop'd.	10·5 long.	8·7	8	8	8
Calibre, in inches	12·01	10·33	10·33	10·33	9·45	9·37	8·24	8·24	8·24	8·24	6·80	6·80	5·87	5·87	5·87	5·87	5·87	5·87	4·92	4·74	3·96	3·43	3·09	3·09	3·19
Length: Total, in feet	21·98	18·77	18·77	17·06	23·63	15·45	24·0	20·61	15·45	12·88	13·94	11·32	14·67	10·73	10·73	10·73	10·68	10·68	9·60	9·6	12·08	6·89	6·89	6·89	5·15
Length: Rifled portion, in ins.	181·9	149·8	150·0	129·3	201·6	116·2	218·2	176·5	124·6	114·9	117·1	102·2	128·5	93·3	87·1	86·7	87·1	86·7	85·7	85·3	113·6	62·7	57·6	57·6	45·9
Length: Powder Chamber „	45·3	44·7	44·4	44·7	53·5	40·9	75·3	46·7	37·1	34·0	31·5	16·7	31·1	19·0	25·1	25·5	25·1	25·5	16·7	16·7	19·5	10·7	10·5	10·5	9·73
Length: Bore, in calibres	18·9	18·8	18·8	16·8	26·1	16·8	35·6	27·1	19·6	18·1	21·9	17·5	27·2	19·1	19·1	19·1	19·1	19·1	20·8	21·6	33·6	21·4	22·0	22·0	17·4
Number of Grooves	72	36	48	36	56	48	48	48	30	30	30	30	36	36	36	24	36	24	32	18	32	24	12	12	12
Depth of Grooves, in inches	0·079	0·077	0·079	0·077	0·059	0·061	0·059	0·059	0·102	0·102	0·063	0·063	0·059	0·061	0·061	0·061	0·061	0·061	0·059	0·051	0·049	0·049	0·049	0·019	0·051
Twist, in calibres	45	50	50	50	25*	45	25*	25*	68	59	45	45*	25*	45	45	68	50	65	40*	60	25*	40*	46	46	46
Weight: Gun, including Breech Gear, tons	35·4	21·7	18·7	17·7	18·7	14·6	13·03	12·3	9·84	8·86	5·51	3·40	4·04	3·44	3·44	3·44	3·15	3·15	1·38	1·35	1·15	0·44	0·32	0·29	0·23
Weight: Breech Block, in lbs.	2954	2050	1973	1973	..	1378	831·1	908·3	831·1	831·1	496·0	414·5	390·2	324·1	324·1	324·1	324·1	381·4	163·1	163·1	149·9	86·0	63·9	63·9	55·1
Weight: Armour-piercing projectile, in lbs.	725·3	412·3	412·3	412·3	474·0	306·4	308·6	308·6	217·2	217·2	117·9	117·9	112·4	76·1	76·1	76·1	76·1	78·3	..	..	..	..	..	..	..
Weight: Common Shell, in lbs.	725·3	357·1	357·1	357·1	474·0	261·5	308·6	308·6	174·2	174·2	112·9	112·9	112·4	65·0	65·0	65·0	65·0	61·1	40·1	33·1	39·7	14·9	9·4	9·4	8·3
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	5·3	5·3	5·3	6·6	3·2	5·5	5·5	2·8	2·8	1·3	1·3	1·5	0·8	0·8	0·8	0·8	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	14·3	14·3	22·0	15·4	15·4	12·1	12·1	6·6	6·6	5·1	5·1	4·3	4·2	4·2	4·2	4·2	..	2·4	2·5	0·9	0·4	0·4	0·6	0·6
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	105·8	105·8	125·7	152·1	67·2	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	13·2	17·1	13·2	..	..	..	..	..	..	..
Weight of Firing Charge: Common Shell, in lbs.	202·8	105·8	105·8	125·7	152.1	50·7	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	12·1	17·1	12·1	8·8	4·6	8·8	3·3	1·1	1·1	0·9
Initial Velocity: Armour-piercing projectile, ft.-sec.	1718	1588	1588	1578	1657	1493	1739	1657	1463	1316	1608	1326	1624	1463	1463	1358	1463	1358	..	...	..	..	..	..	..
Initial Velocity: Common shell, ft.-sec.	1713	1641	1641	1654	•1657	1391	1739	•1657	1394	1276	1654	1342	•1624	1555	1555	1447	1555	1447	1545	1280	1526	1545	1148	1119	1053
Muzzle Energy: Total, foot-tons	14,740	7211	7211	7119	9024	4736	6471	5876	3225	2606	2112	1436	2055	1131	1131	974	1131	1002	..	..	..	..	..	..	..
Muzzle Energy: Per in. circ., ft.-tons	391	223	223	220	304	161	250·0	227	125	101	98·9	67·3	111·5	61·3	61·3	52·8	61·3	54·3	..	..	..	..	..	..	..
Perforation at Muzzle, in ins.	20·5	15·4	15·4	15·3	18·1	13·0	16·4	15·6	11·4	10·1	10·3	8·3	11·0	8·0	8·0	7·4	8·0	7·5	..	..	..	..	..	..	..

NOTE.—See two 40-cm. Krupp L.S. guns, given on Col. Maitland's Table, p. 357, *Annual* 1886, and one in the *Naval Annual* for 1888–89, p. 367, viz. 119 tons weight. The 30·5, 26, and 24-cm. guns fire steel armour-piercing projectiles.

* Maximum twist.

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.				B.L.	Armstrong Muzzle Loading.							Muzzle Loading. Old Pattern.		Breech Loading.	
Designation by Calibre, in centimètres	43‡ New Pattern.	43‡ Early Pattern. 1882.	15†	12*	12	45	28 New Pattern.	25 No. 1 Long.	25 No. 2 Short.	25 No. 2.	22	20	16	16	7·5 No. 1.	7·5 No. 2.
Calibre, in inches	17	17	5·91	4·72	4·7	17·72	11	10	10	10	9	8	6·5	6·5	3	3
Length: Total, in feet	40·75	39	13·8	8·5	9·25	32·7	14·4	14·4	14	13·8	13·8	10·8	11·8	10·6	5·8	3·3
Length: Rifled Bore, in inches	346·8	315·7	126	75	88	302	121	120	114	112	106	89	96	87	52	27
Length: Powder Chamber, in inches	84·5	98	28	10·8	22	56·5	24·5	26·0	26·0	14·0	19·5	15·7	21·3	21·3	10·2	7·9
Length: Bore, in Calibres	27	26	26	20·2	23·5	20·5	13·2	14·6	14·0	12·6	13·9	13·1	16·8	15·5	20·7	11·7
No. of Grooves	82	82	28	37	36	28	9	7	7	8	6	6	6	6	12	12
Twist of Rifling, in Calibres	50	50	40	40	42	50	35	40	40	55	45	45	42·5	27·3	48	48
Total Weight, in tons	104·3	101·5	4	1·21	1·38	100	25·0	18·0	18·0	12·1	12·6	7·02	5·12	3·54	0·29	0·095
Firing Charge: Armour-piercing projectile, in lbs.	900·0	725	34	..	..	551	94·8	77·2		63·9	50·0	35·0	19·8	..	..	..
Firing Charge: Common Shell, "	600	480	25	5·5	9·3	440·9	66·1	52·9		41·9	33·0	21·0	7·1	7·1	1·9	0·7
Weight: Armour-piercing projectile, "	2000	2000	80	..	..	2000	560·0	451·9		331·8	250·0	180·0	101·4	..	..	..
Weight: Common Shell, "	2000	2000	80	32·4	36·4	2000	533·5	399·0		284·4	250·0	180·0	66·1		91·7	93·0
Weight: Shrapnel " "	2000	2000	80	34·4	37·37	2000	533·5	399·0		284·4	250·0	180·0	66·1		91·7	93·0
Weight: Case Shot "	2000	2000	70	23·5	35·9	2000	200·1	188·1		135·6	99·6	79·4	33·1		64·6	64·6
Bursting Charge: Armour-piercing projectile, "	32	32	1·5	..	..	32	15·0	11·1		8·4	6·3	3·6	..		..	..
Bursting Charge: Common Shell, "	60	60	5	3·1	2·2	78	26·0	23·8		18·2	18·8	9·7	2·8		0·3	0·4
Bursting Charge: Shrapnel " "	5	5	0·16	0·28	0·35	5	2·2	1·85		1·96	1·48	0·71	0·50		0·02	0·02
Muzzle Velocity, in feet	1992	1935	1946	1345	1591	1700	1329	1388		1373	1442	1353	1303	1024	1335	..
Muzzle Energy: Total, foot-tons	55,030	51,930	2100	..	..	40,060	6859	6035		4369	36,040	22,850	1195	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	114·1	..	..	753·4	198·6	192·2		139·1	128·6	99·8	54·4	..	..	..
Perforation at Muzzle, inches	33·7	32·8	11·2	..	..	28·5	14·2	14·1		12·0	11·5	10·1	7·5	..	..	..
Metal employed in structure	St.	I. & St.	St.	St.	St.	Steel tube in Wrought Iron jacket.							I. & St.	Cast I.	Br.	Br.

St. stands for steel, I. for iron, Br. for Bronze.

* 120-mm. army shot, besides which there exist 120-mm. quick-firing guns, L. 40 (Piemonte), L. 33 (Duilio, Dandolo, Formidabile). † There exist 152-mm. cannons (Armstrong and bronze-bore) with metal cartridges (Piemonte, Fieramosca, Re Umberto, Ancona, Doria). There are also two kinds of 149-mm. bore, and two, one short and one long; also a new bore for metal cartridges (Italia). ‡ There are four types of these bores, viz.: types Lauria, Lepanto, Italia, Valente.

RUSSIAN NAVAL ORDNANCE.

	Obuchoff Steel Breech Loading Hooped Guns.											Steel B.L. Guns.		
Designation by Calibre, in inches	12 Long.	12	11	11 Pattern 77.	9	9	8	6 Long.	6·03	6	Long 9-pdr.	4·2 (9-pdr.)	3·43 Long (4-pdr.)	3·43 (4-pdr.)
Calibre in centimètres	30·48	30·48	27·94	27·94	22·86	22·86	20·32	15·24	15·32	15·24	10·67	10·67	8·70	8·70
Total Length, in feet	30	20	18·3	20·0	15·0	13	14·6	14	12·2	11·7	6·9	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	165·0	152·0	158·0	124·0	..	128·0	118·7	106·0	98·0	61·5	65·0	62·6	53·0
Length of Powder Chamber „	..	38·5	35·0	50·4	28·5	..	23·0	30·5	22·4	22·2	10·5	8·0	10·7	..
Length of Bore in calibres, including Powder Chamber	..	17	17	18·9	16·9	..	18·9	24·9	21·3	20	17·1	17·4	21·4	..
Number of Grooves, in inches	..	36	36	64	32	32	30	..	24	24	24	16	24	12
Depth of Grooves „	0·070	0·135	0·135	0·135	0·110	0·110	0·090	0·060	0·085	0·070	0·055	0·055	0·050	0·050
Twist of Rifling in calibres	..	73·5	70	..	60	60	70	*24	60	68	*40	50	40	41
Total Weight, in tons	50·45	39·9	28·2	28·2	15·0	12·5	9·67	4·07	4·35	4·03	0·60	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	..	665·8	515·9	..	249·1	275·6	172·0	..	97·6	86·0	..	..	..	..
Weight of Chilled Shell, „	731·9	665·8	515·9	562·2	275·6	264·7	169·8	119·0	86 0	86·0	..	..	..	..
Weight of Common Shell, „	..	639·3	496·0	520·3	266·8	266·8	172·0	..	81·6	81·6	27·6	24·2	15·2	12·6
Weight of Case Shot, „	..	293·2	216·1	..	176·4	176·4	134·5	..	57·3	57·3	27·6	22·3	15·2	11·0
Weight of Firing Charge. Steel Shell, „	..	144·4	115·3	..	64·2	47·0	81·5	..	14·3	18·1	..	..	..	..
Weight of Firing Charge. Chilled Shell, „	246·9	144·6	90·6	132·2	47·0	47·0	29·3	37·5	14·3	18·1	..	..	..	..
Weight of Firing Charge. Common Shell, „	..	117·3	81·6	132·2	42·1	42·1	28·4	..	10·8	14·3	4·5	2·6	3·1	1·3
Muzzle Velocity, in feet	1942	1470	1486	1516	1463	1260	1352	..	1206	1463	..	..	1444	..
Muzzle Energy: Total, foot-tons	19140	9965	7905	8999	3701	3035	2180	..	982	1276	..	..	..	..
Muzzle Energy: Per Inch Circumference, foot-tons	508·4	264·5	229·4	260·4	130·9	107·4	86·7	..	51·8	67·74	..	..	..	..
Perforation † at Muzzle, in inches	23·6	16·7	15·5	16·6	11·7	10·5	9·5	..	7·2	8·4	..	..	..	..

* Maximum of increasing twist. † Through iron unbacked.

NOTE.—To the guns shown in this table others of newer type have since been added; namely—3 powerful guns of 35 calibres length; a 12-in. gun weighing 33·7 tons; a 9-in. gun of 19·4 tons weight, said to fire a projectile of 268 lbs. with a muzzle velocity of 2376 feet; and an 8-in. gun of 13·64 tons weight, firing a projectile of 192·26 lbs. with a velocity of 1925 feet, or one of 172·35 lbs. with a velocity of 2041 feet; also a long 9-pdr.

SPANISH NAVAL ORDNANCE.

	Hontoria, New Pattern. Breech Loading.				
Designation by Calibre	16-cm. No. 1.	16-cm	12-cm.	9-cm.	7-cm.
Calibre, in inches	6·34	6·34	4·72	3·54	2·76
Length: Total length, in feet	13·8	9·63	10·4	7·8	3·7
Length: Rifled Portion, in inches	125·6	89·8	94·5	70·9	35·4
Length: Powder Chamber, in inches	31·9	17·3	23·8	17·7	6·1
Length: Bore, in calibres	25	16·9	25	25	15
No. of Grooves	38	38	30	22	18
Depth of Grooves, in inches	0·59	0·59	0·49	0·49	0·49
Twist of Rifling, in calibres	Increasing from 100 to 49.	56	Increasing from 100 to 40.		
Total Weight, in tons	5·6	2·71	1·4	0·59	0·10
Weight: Armour-piercing projectile, in lbs.	93·7	..	..	..	..
Weight: Common Shell, in lbs.	83·8	63·9	36·2	15·4	7·28
Weight: Ring Segment, in lbs.	83·8	..	33·1	17·0	7·9
Firing Charge: Armour-piercing projectile, in lbs.	26·5	..	..	..	..
Firing Charge: Other projectiles	24·3	15·4	13·2	6·28	0·99
Muzzle Velocity, in feet	1631	1493	1749	1837	1037
Muzzle Energy: Total, in foot-tons	1729	988	702	..	..
Muzzle Energy: Per inch circumference, foot-tons	87·4	..	..	..	..
Perforation at Muzzle, in inches	9·6	..	..	..	..
Metal and Construction	St. & Cast I.		St. Hoop'd.		St.

	Hontoria, Pattern 83. Breech Loading.					
Designation by Calibre	32-cm.	28-cm.	24-cm.	20-cm.	16-cm.	12-cm.
Calibre, in inches	12·60	11·02	9·45	7·87	6·34	4·72
Length: Total length, in feet	38·7	33·8	..	..	19·3	14·5
Length: Rifled Portion, in inches	352·4	309·1	..	..	170·9	135·8
Length: Powder Chamber, in inches	86·8	77·1	..	..	49·8	39·4
Length: Bore, in calibres	36*	36*	..	..	36*	37*
No. of Grooves	80	70	60	50	40	30
Depth of Grooves, in inches	0·59	0·59	0·59	0·59	0·59	0·49
Twist of Rifling, in calibres	From 0 to 30.					
Total Weight, in tons	49·2	32·5	19·8	11·5	6·1	2·6
Weight: Armour-piercing projectile, in lbs.	1058	837·8	440·9	253·5	132·3	55·1
Weight: Common Shell, in lbs.	..	..	..	..	116·8	49·6
Weight: Ring Segment, in lbs.	..	..	..	..	116·8	49·6
Firing Charge: Armour-piercing projectile, in lbs.	..	..	..	..	..	..
Firing Charge: Other projectiles	..	..	..	..	..	..
Muzzle Velocity, in feet	..	..	..	..	..	..
Muzzle Energy: Total, in foot-tons	..	..	..	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	..	..	..	..	..	..
Perforation at Muzzle, in inches	..	..	..	..	..	..
Metal and Construction	St. Jacket and Hoops.					

	Armstrong, Pattern 83.					
Designation by Calibre	24-cm.	20·3-cm	15-cm.	12-cm.	8·4-cm	7·5-cm long.
Calibre, in inches	9·449	8·00	6·00	4·72	3·3	2·95
Length: Total length, in feet	29	18·4	17·00	13·75	7·9	7·51
Length: Rifled Portion, in inches	260·2	162·0	158·3	135·8	75·0	70·7
Length: Powder Chamber, in inches	66·9	43·5	31·4	19	13	13
Length: Bore, in calibres	35	26	32	33	27	28·7
No. of Grooves	60	33	28	22	20	18
Depth of Grooves, in inches	0·49	0·025	0·037	0·03	0·03	0·03
Twist of Rifling, in calibres	30	45	30	40	30	35
Total Weight, in tons	21	11·5	5·0	2·2	0·45	0·35
Weight: Armour-piercing projectile, in lbs.	445	180	100·0	40·0	..	..
Weight: Common Shell, in lbs.	393	180	100·0	40·0	15·0	12·0
Weight: Ring Segment, in lbs.	..	..	..	40·0	15·0	12·0
Firing Charge: Armour-piercing projectile, in lbs.	220	90	55·0	16·0	..	..
Firing Charge: Other projectiles	145	65	34·0	12·0	4·0	3·75
Muzzle Velocity, in feet	1950	2020	2070	2000	1625	1709
Muzzle Energy: Total, in foot-tons	11730	5094	2972	1109	275	243
Muzzle Energy: Per inch circumference, foot-tons	397·4	203·8	156·4	75·15	..	..
Perforation at Muzzle, in inches	20·9	15·0	13·22	9·09	..	..
Metal and Construction	St.					

	Armstrong. Muzzle Loading.		Armstrong. Pattrn 81 B.L.	Krupp. Breech Loading.				
Designation by Calibre	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	8·7-cm	7·5-cm	7·5-cm short.
Calibre, in inches	9·00	8·00	6·00	5·87	4·72	3·43	2·95	2·95
Length: Total length, in feet	13·0	11·9	14·5	17·13	11·81	6·9	6·3	3·22
Length: Rifled Portion, in inches	104·0	102·0	126·9	..	..	..	57·6	..
Length: Powder Chamber, in inches	..	..	29·7	..	..	..	..	..
Length: Bore, in calibres	14	14·75	26·1	35*	30*	24*	25·8*	13*
No. of Grooves	6	4	28	36	32	24	24	24
Depth of Grooves, in inches	0·18	0·18	..	0·59	0·59	0·49	0·49	0·49
Twist of Rifling, in calibres	45	40	100 to 40	25	25	40	36	25
Total Weight, in tons	12·5	9·0	4·0	4·6	2·1	0·49	0·30	0·09
Weight: Armour-piercing projectile, in lbs.	2500	180·0	78·0	85·10	43·65	..	..	..
Weight: Common Shell, in lbs.	2500	180·0	83·6	65·70	34·61	14·6	9·48	9·48
Weight: Ring Segment, in lbs.	..	..	..	..	34·61	14·6	9·04	9·04
Firing Charge: Armour-piercing projectile, in lbs.	50·0	35·0	34·0	37·48	19·29	..	..	..
Firing Charge: Other projectiles	33·0	21·0	39·0	..	..	10·3	10·4	..
Muzzle Velocity, in feet	..	..	1936	2182	2034	1539	1542	961
Muzzle Energy: Total, in foot-tons	..	..	2173	2809	1252	..	..	..
Muzzle Energy: Per inch circumference, foot-tons	..	..	..	152·4	84·45	..	..	..
Perforation at Muzzle, in inches	..	..	..	12·9	9·63	..	..	..
Metal and Construction	St. and Wt. I.		St.	St.				

18 and 16-cm. Palliser guns and 16 and 13-cm. Parrot guns also exist.
St. stands for Steel; I. for Iron.

* Total length, the length of bore not being supplied.

NAVAL ORDNANCE OF SWEDEN AND NORWAY.

	Sweden.				Norway.								
	Breech Loaders.			M.L.	Krupp, Hooped B.L.		Armstrong, M.L.				Palliser, M.L.		Cast-iron, M.L.
Designation by Calibre	27-cm.	24-cm.	17-cm.	12-cm.	26-cm.	15-cm.	8½-in.	8½-in.	8½-in.	6½-in.	5½-in.	5-in.	5-in.
Calibre, inches	10·80	9·45	6·58	4·80	10·24	5·91	10·51	10·51	10·51	7·88	6·58	6·11	6·11
Total Length, feet	17·46	14·96	11·27	8·87	18·77	12·63	16·87	14·66	13·49	10·82	11·58	10·30	11·21
Length { Rifled Portion of Bore, in inches	161·8	138·0	108·6	83·3	160·4	112·4	137·3	121·0	110·6	85·7	92·4	91·7	101·6
Length { Chamber, "	30·0	26·7	16·8	13·6	34·1	22·6	38·2	24·0	20·5	18·5	19·3	10·8	14·5
Length { Bore in calibres, "	17·8	17·4	19·1	20·2	19·0	22·8	16·7	13·8	12·5	13·2	17·0	16·8	19·0
Number of Grooves	5	5	5	8	60	36	8	8	8	6	3	3	3
Twist of Rifling	..	30	..	40	45	45	55	55	55	50	34	34	34
Total Weight, tons	23·9	14·4	5·2	1·9	21·7	3·9	21·4	19·5	18·1	7·5	4·8	3·4	2·9
Weight of { Chilled Shell, lbs.	476·2	317·5	108·0	..	463·0	86·0	447·5	385·8	385·8	153·2	110·2	..	..
Weight of { Common Shell, "	396·8	224·9	76·3	34·6	381·4	69·4	308·6	308·6	308·6	148·8	82·7	59·1	59·1
Weight of Firing Charge { Chilled Shell, lbs.	98·1	59·5	23·4	..	99·2	18·7	121·3	71·7	66·1	29·7	22·0	..	..
Weight of Firing Charge { Common Shell, "	66·1	37·5	17·6	6·6	81·6	18·7	77·2	38·6	38·6	19·8	11·0	7·17	7·17
Muzzle Velocity, feet.	1365	1322	1378	..	1575	1575	1555	1378	1296	1296	1329	..	..
Total foot-tons	6152	3848	1422	..	7966	1479	7502	5082	4495	1785	1350	..	..
Muzzle Energy { Per inch Circumference	179·6	129·6	68·8	..	247·7	79·7	227·3	153·9	136·1	72·1	65·3	..	..
Muzzle Energy { Perforation through Iron	13·65	11·5	8·4	..	16·2	9·2	15·6	12·6	11·8	8·6	8·2	..	..

Sweden.—The breech-loaders have breech screw-stoppers. The whole of the guns also discharge case-shot, and the 12-cm. discharge also shrapnel. Solid shot.
Norway.—Besides the chilled shell, there are also chilled solid shot for the 8·5-in. and the 6·5-in guns, and for all muzzle-loaders case-shot also.

UNITED STATES NAVAL ORDNANCE.

Forged Steel, built up B.-L. Guns.

Name of Gun.	Calibre.	Length of Gun. Total Length.	Length of Gun. Length of Bore.	Length of Gun. Length of Bore.	Length of Gun. Rifled Portion.	Length of Gun. Powder Chamber.	Twist of Rifling.	Total Weight.	Weight of Projectiles. Armour Piercing.	Weight of Projectiles. Common.	Charge. Firing.	Charge. Bursting.	Initial Velocity.	Muzzle Energy.	Perforation of Wrought Iron at Muzzle.
	inch.	inch.	inch.	Cal.	inch.	inch.		tons.	lbs.	lbs.	lbs.	lbs. or oz.	ft. per sec.	ft.-tons.	inch.
Finished.															
5-in. B.L.R.	5	162·0	152	30·6	120·75	29·2	1 turn in 30 cals.*	2·77	60	60	30	3	1960	1,599	10·6
6-in. B.L.R.	6	196	185·75	31·12	144·26	40·49		4·58	100	100	50	6	2105	3,072	13·4
8-in. B.L.R.	8	257·99	242·46	30·43	194·16	49·61		12·53	250	250	125	13	2050	7,286	17·8
10-in. B.L.R.	10	329·10	310·22	31·02	246·26	60·96		26	500	500	250	22	2100	15,290	23·1
Under Construction.															
8-in. B.L.R.	8	264·5	248·97	31·25	195·80	53·21		11·48	250	250	125	13	2100	7,643	18·3
10-in. B.L.R.	10	329·1	310·22	31·02	246·26	60·96		26·0	500	500	250	22	2100	15,290	23·1
10½-in. B.L.R.	10½	368·6	350·0	33·3	281·8	69·0		29·0	550	550	275	24	2100	16,813	23·7
Forgings contracted for.†															
12-in. B.L.R.	12	422·6	400·12	33·42	319·81	79·31		47·0	850	850	425	88	2100	25,984	27·6

* Rifling polygroove, increasing twist. In the 8-inch Rifle, from 1 in 180 to 1 in 30 calibres at 13 inches from muzzle, then uniform.

† The 12-inch, as well as 6, 8, and 10-inch guns are to be finished in the Naval Ordnance Factory, Washington; 16-inch guns of 109 tons and 150 tons are designed.

TABLE RELATING TO CONVERSION OF MEASURES.

Length.

METRIC TO ENGLISH. ENGLISH TO METRIC.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.). mètres. yards. 2000=2187·3 300= 328·09 50= 54·68 4= 4·37 ∴ 2354=2574·44	of feet in 12·4 mètres (see cols. I. & III.). mètres. feet. 10 =32·809 2 = 6·562 0·4= 1·312 ∴ 12·4=40·683	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm. cms. inches. 30·0=11·811 ·5= ·197 ∴ 30·5=12·008	of mètres in 1026 yards (see cols. V. & VI.). yards. mètres. 1000=914·38 20= 18·29 6= 5·49 ∴ 1026=938·16	of mètres in 1742 feet (see cols. VII. & VIII.). feet. mètres. 1000=304·79 700=213·36 40= 12·19 2= 0·61 ∴ 1742=530·95	of centimètres in 17·72 ins. (see cols. IX. & X.) inches. cms. 10·0 =25·400 7·0 =17·780 0·7 = 1·778 ·02= ·051 ∴ 17·72=45·009

NOTE.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inches; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

METRIC TO ENGLISH. ENGLISH TO METRIC.

I. Kilo-grammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoir-dupois.	VIII. Kilo-grammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	8	3·048	3	1·3608	3	·1944
4	·008937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier). milliers. tons. 30 = 29·53 5 = 4·92 ∴ 35 = 34·45	of pounds in 56·3 kilo- grammes. (see cols. I. & III.). kgrms. lbs. 50 =110·231 6 = 13·228 0·3= ·661 ∴ 56·3=124·120	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.) grammes. grains. 100=1543·23 20= 308·65 ∴ 120=1851·88	of milliers in 38 tons (see cols. V. & VI.). tons. milliers. 30 = 30·48 8 = 8·13 ∴ 38 = 38·61	of kilogrammes in 68 pounds (see cols. VII. & VIII). lbs. kgs. 60 = 27·216 8 = 3·629 ∴ 68 = 30·845	of grammes in 85 grains (see cols. IX. & X.). grains. grammes. 80 = 5·184 5 = 0·324 ∴ 85 = 5·508

NOTE.—7000 grains troy=1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilo-grammes per square centi-mètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilo-grammes per square centi-mètre.	VI. Tons per square inch.	VII. Kilo-grammes per square centi-mètre.	VIII. Atmo-spheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmo-spheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01270	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).	of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).	of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).	of kilogrammes per square centimètre in 18·3 tons per square inch (see cols. VI. & VII.).	of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).	of atmospheres in 14·6 tons per square inch (see cols. X. & XI.)
kgs. per sq. cm. = lbs. per sq. in.	kgs. per sq. cm. = tons per sq. in.	lbs. per sq. in. = kgs. per sq. cm.	tons per sq. in. = kgs. per sq. cm.	atmospheres. = tons per sq. inch.	tons per sq. in. = atmospheres.
30 = 426·68	3000 = 19·05	10 = ·7031	10 = 1574·9	3000 = 19·69	10 = 1523·8
2 = 28·45	200 = 1·27	5 = ·3516	8 = 1259·95	200 = 1·31	4 = 609·5
0·1 = 1·42	10 = ·06		0·3 = 47·25	50 = ·33	0·6 = 91·4
				4 = ·03	
∴ 32·1 = 456·55	∴ 3210 = 20·38	∴ 15 = 1·0547	∴ 18·3 = 2882·1	∴ 3254 = 21·36	∴ 14·6 = 2224·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-tonne is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).	of mètre-tons in 3592 foot-tons (see cols. III. & IV.).
mètre-tons. = foot-tons.	foot-tons. = mètre-tons.
4000 = 12916·2	3000 = 929·1
300 = 968·72	500 = 154·84
60 = 193·74	90 = 27·87
7 = 22·60	2 = ·62
∴ 4367 = 14101·26	∴ 3592 = 1112·43

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

I.

Statement of the First Lord of the Admiralty explanatory of Navy Estimates, 1890–91.

Introductory remarks.

The estimated expenditure for the year ending 31st March, 1891, borne on the annual votes presented to Parliament, is £13,786,600, being an increase of £101,200 over the sum voted for the preceding year. This is independent of the expenditure which is to be covered by the £10,000,000 provided in the Naval Defence Act of last Session, and which is at the disposal of the Admiralty for the building and equipment of the thirty-two war vessels enumerated in Schedule 1 of that Act, and which are to be completed for sea within five years from the passing of the Statute.

Imperial Defence Act of 1888.

An agreement, subsequently embodied in the Imperial Defence Act of 1888, was made in 1887, at London, between the Imperial Government and the representatives of the Australian Colonies, by which a squadron of seagoing vessels was to be provided for the special protection of the floating commerce in Australasian waters. The ultimate cost of this squadron was to be divided between the Home and Colonial Governments, the former providing the funds for the construction and armament, and the officers and men for the manning of these vessels. In return, an annual subsidy was to be paid by the Colonies, for twelve years, for the additional protection afforded by this force. The ships will be completed in the present financial year, and provision is made in the Estimates for the officers and men and stores necessary to commission them. A portion of the subsidy payable is taken as an appropriation in aid of the Vote.

Australian squadron.

Provision for Indian floating defences.

A further provision for the officers and men required for the floating defences of the Indian Government is made under Votes A and 1, the Indian Government paying the full cost of the service rendered.

Thus the number of officers and men to be provided is increased by the imposition of these new duties upon the Navy, and in return the appropriations in aid of Naval Votes are largely augmented by the payments receivable from the Australian and Indian Governments.

Progress of ship-building.

In order to make clear the advance in shipbuilding during the past year, it is necessary to classify the vessels in course of construction, according to the separate and distinct financial arrangements which have been made to meet their cost.

Ships provided for in Navy Estimates.

First in order are the ships built both by contract and in the dockyards, contained in the old shipbuilding programme sanctioned prior to April, 1889. The whole cost of these vessels is defrayed from the Parliamentary Votes.

Ships in Naval Defence Act of 1889.

In the second place must be considered the ships to be built under the Naval Defence Act of last Session. These comprise (*a*) thirty-eight ships to be built in the dockyards, and (*b*) thirty-two to be built by contract.

(*a*) The thirty-eight dockyard ships are to be paid for by monies annually voted by Parliament, but any balance unexpended at the close of the year out of the funds appropriated to their construction is to be carried to the credit of the account in the forthcoming year.

(*b*) The cost of the thirty-two ships to be built by contract is to be defrayed by a fund of £10,000,000, so placed at the disposal of the Admiralty as to enable the whole of these vessels to be laid down and completed with the utmost celerity. No part of this sum is borne on the votes presented to Parliament.

Australian squadron.

Thirdly. The Australian squadron was built under the Act of Parliament already referred to, and the funds were provided under a special arrangement. No portion of the capital representing the first cost of this expenditure is contained in the Annual Votes.

Special accounts.

It will thus be seen that the cost of the vessels in the categories 2, *b*, and 3 is excluded from the Estimates now presented to Parliament. But in order that Parliament might be in possession of the progress of and expenditure on the whole of the ships building and completing, a form of account has been specially framed for publication in the Estimates, in which full information is given concerning all these vessels.

Dockyard work.

The programme for 1889–90 provided for the completion of thirty-three new vessels, and passing them into the 1st Class Reserve during the year The ships are as follows:—

Armoured Ships.

Trafalgar.	Sans Pareil.
Victoria.	Camperdown.

Protected Ships.

Magicienne.	Barracouta.
Marathon.	Barrosa.
Melpomene.	Blanche.
Bellona.	Blonde.
Barham.	

Unprotected Ships.

Basilisk.	Goldfinch.
Beagle.	Lapwing.
Sharpshooter.	Magpie.
Gossamer.	Redbreast.
Salamander.	Redpole.
Seagull.	Ringdove.
Sheldrake.	Widgeon.
Skipjack.	Sparrow.
Spanker.	Thrush,
Speedwell.	Mayflower.

This part of the programme will be carried out, except as regards ten of the vessels, viz.:—

Ships not completed. The armoured ship Sans Pareil, whose guns will not be delivered till some time in the year 1890–91; the protected ships, Bellona, not delivered in time by contractors; Barham, delayed by machinery not being delivered in time; and Blanche and Blonde, the machinery of which was delayed in delivery by the contractors; and the unprotected ships Salamander, Seagull, Sheldrake, and Skipjack, which will be delayed by steam trials; and the Gossamer, which was kept back in order that a sister ship building at the same yard might be advanced beyond the programme rate, this arrangement having been found more convenient for the work of the dockyard.

The vessels thus left incomplete in 1889-90 will be completed early in the financial year 1890-91.

The whole of the ships that were ordered and commenced before 1889-90 will be completed during 1890-91, with the exception of Blake and Blenheim, thus leaving, with the exception of the two vessels named, only ships of the new programme for the financial year 1891-92.

New programme. Of the 38 vessels of the new programme under the Naval Defence Act that are to be built in the dockyards, 21 have already been commenced, 7 more will be commenced in 1890-91, and only 10 will be left to commence after March, 1891. The 10 thus left till after

next year are 5 2nd-class cruisers (Apollo class), and 5 torpedo gunboats.

The design of the second-class battle-ships has been most thoroughly considered, and is now nearly complete, but as a final decision has not been reached by the Board, any description is not possible at present.

Contract work. Naval Defence Act.

Of the 32 vessels that have to be built by contract under the Naval Defence Act, 26 were ordered before the close of 1889. The remaining 6 vessels are torpedo gunboats, which admits of being rapidly constructed, and which have been held over for the present. These 26 vessels include

4	Battle Ships of the 1st Class,
5	Protected Cruisers of the 1st Class,
17	" " " 2nd "
26	

Ships in dockyards ahead of ships in private yards.

It was decided, after careful consideration, to give to the dockyards-built ships of each type a sensible start upon the contract-built ships of a similar type, in order that all details of fitting and equipment might be thoroughly worked out in the dockyards by naval and professional officers, and thus be available for guidance in the construction of the contract ships.

Order of placing the contracts.

Furthermore it was preferred to place the orders for the several types of vessel successively. First, the 17 second-class cruisers were dealt with, then the 5 first-class cruisers, and, finally, the 4 first-class battle-ships. This course of procedure has proved most satisfactory under very difficult circumstances. Eleven of the leading shipbuilding firms in the country have been entrusted with the construction of the vessels, nearly all of them having had previous experience of war-ship construction. The work has also been widely distributed. Eight of the vessels are building on the Tyne, eight on the Clyde, four on the Thames, three at Barrow, two at Hull, and one on the Mersey. Work on the second-class cruisers is rapidly advancing: the larger cruisers and the battle-ships are, as yet, in early stages of construction. Particulars of the progress made, as evidenced by expenditure, will be found in the Navy Estimates.

Distribution of the work.

The whole of the 32 vessels to be built by contract have thus been placed, except 6 torpedo gunboats, which have been kept back purposely, pending the conclusion of the steam trials now going on.

Boiler power increased.

The designs of all these classes are described in the statement of last year. The only point requiring any mention is the addition that has been made to the boiler-power of the cruisers, in order to increase their steaming capacity under the conditions of actual service.

All the torpedo boats which were in progress at the beginning of the financial year have been delivered by the builders, and it is not proposed to order any new boats in 1890-91.

Ships for Australian service.

The vessels building by contract for Australian service under the Imperial Defence Act of 1888 have been somewhat delayed in progress. They are, however, now far advanced towards completion, and it is anticipated will be ready for service next summer.

Improvements in details of design.

During the manœuvres of 1889 a large number of new vessels were employed. Three classes attracted special attention, each of which was represented by several examples. There were five vessels of the Admiral class, six of the Orlando class, and five of the Medea class. As might have been anticipated in vessels of new type when first commissioned, improvements in matters of detail were suggested as the result of experience. The most important of these had relation to coal transport and ventilation of engine-rooms beneath protective decks. These suggestions have been carefully considered, and the improvements considered necessary are now in progress.

In the ships of the Naval Defence Act these improvements form part of the original design.

Reconstruction and repairs.

Home yards.

With regard to the reconstruction and refit of ships in commission and reserve, the Triumph, Audacious, Ruby, and Penguin, have been completed; and the work upon Thunderer, Minotaur, Superb, and Achilles have been advanced during the year to such an extent that all, except Achilles, will be finished early in 1890-91.

These ships could have been completed in 1889-90 if it had not been necessary to carry out unforeseen alterations and additions to ships in the first and second classes of the reserve, which were of pressing importance, and thus took precedence of work upon the ships named.

The Devastation and Rupert could not well be spared from their stations to be taken in hand for placing their new engines on board until the beginning of April next.

Yards abroad.

At the Naval yards abroad, the work upon ships for commissioning, has been practically carried out during the year, as laid down in the Estimates.

Dockyard administration.

The expenditure upon ships and services at the Dockyards and the various items of incidental charges are closely scrutinised, and are being kept down as much as possible consistently with efficiency.

Examination of Estimates.

The estimates for the building and repairs of ships and for other works are carefully examined before they are approved, and it is very seldom, and only in exceptional circumstances, that an estimate is now

exceeded. The cost of building ships in the Dockyards is steadily diminishing, though it is not yet so low as that of some of the ships procured by contract, after allowing a reasonable amount for incidental charges.

Yards abroad. A thorough examination of the administration and business of the Foreign Naval Yards has been commenced, with the view of improving their efficiency and economising their expenditure. It is a work of time to complete this examination, in consequence of the long distance from England of some of the principal establishments to be visited, but the work will be concluded as soon as possible.

Machinery and steam trials. Since the 31st March last the following ships have passed their final machinery trials under forced draught, and the limited forced draught, designated natural draught, viz.:—

No.	Class.	Name.
1	Battle Ships	Trafalgar.
5	2nd Class Cruisers	Medea, Magicienne, Medusa, Melpomene, Marathon.
1	3rd " "	Barrosa.
2	Twin Screw Sloops	Beagle, Basilisk.
7	1st Class Screw Gunboats . .	Magpie, Widgeon, Redbreast, Sparrow, Redpole, Thrush, Goldfinch.
2	Torpedo Gunboats	Grasshopper, Sandfly.
6	1st Class Torpedo Boats	
10	2nd " " "	
2	Coaling Barges	

The machinery of these ships, with certain few exceptions, passed their trials satisfactorily on the first occasion, and in most cases exceeded the contract indicated horse-power, and produced this power with less air pressure than that specified.

The trials of the following ships will be carried out early in the spring, viz.:—Blanche, Vulcan, Pandora and Phœnix, the last two being second-class cruisers for Colonial service.

Full-power trials postponed. The full-power trials of the undermentioned ships have been postponed, viz., Sharpshooter, Spanker, Speedwell and Seagull; and the full-power forced-draught trials of the remainder of this class will not be attempted until after a series of progressive trials with one of the type have been concluded.

Defects have been reported in the boilers of some ships at home and abroad, whether fitted or not with forced draught; but these have been made good by the engine-room staff in many cases, and in general it may be said, that with greater experience in the working of the machinery the results will steadily improve. The increased provision for making and maintaining a supply of fresh water for the boilers will also diminish these defects. This is borne out by the result of the manœuvres of last year as compared with that of those of the year before. Defects in boilers with forced draught.

The design of the boilers and engines of a ship must largely depend upon the service for which she is built. The engines and boilers of a man-of-war are not required to work generally at their highest power, as rapid moving from place to place is not the ordinary work of a war-vessel. Moreover, in a fighting ship the weight of the machinery and the space it occupies are primary considerations, it being considered necessary to protect the engines and boilers either by keeping them below the water-line, or, if above, by defensive armour. Machinery of war-ships. Special conditions.

The machinery of a war-ship is therefore designed so as to be capable of performing the varying services required of it, which comprise working generally at moderate powers, an ability to meet frequent changes of power according to the duty in which the ship may be engaged, together with a potential force in reserve capable of exerting for short periods a power many times greater than that usually required.

These conditions, combined with the limitations of weight and space, tend to make the engines less economical in consumption of fuel; and the frequent changes of power tell much more severely on the boilers than would be the case if the engines were working at a nearly uniform power, as in the case of a merchant steamer.

Thus the forced draught full power of the Vulcan is 12,000 horses, and the engines and boilers have been so designed that this power should be obtained out of them with air pressure not exceeding 2 inches. This full power is intended to be used for limited periods, such as might be necessary in an action of a few hours, or for chasing or out-manœuvring an enemy. For longer periods, the forced draught is used to the limited extent of air pressure, not exceeding half-an-inch, required for the production of the specified (so-called) natural draught power of 8000 horses. Vulcan as an example.

In the cruisers of the first and second class now building under the Naval Defence Act, the weights of the boilers have been increased by from 16 to 25 per cent. This will give increased boiler capacity, and admit of beneficial alterations in design. 1st and 2nd class cruisers.

2nd class battle-ships.

A similar course, viz. an addition of 23 per cent. to the weight of the boilers, and a small amount to the machinery, will be adopted in the second-class battle-ships. No such alteration is considered necessary in the machinery of the first-class battle-ships.

Admiralty policy.

Instead of continuing to design the boilers so that the steam required for full-forced draught power can only be obtained by the exertions of the very best stokers and picked coal, on measured mile conditions, the present policy is to increase the weights and the dimensions of the boilers, so that the higher powers occasionally required may be more readily developed and maintained.

Measured mile trials.

The steam trials on the measured mile are necessary for purposes of comparison, and to ensure that the engines are capable of developing the indicated horse-power they were designed to furnish. But the speed, which for limited periods over the measured mile can be attained either by forced or natural draught, is no criterion of the continuous sea-going speed of the vessel. To the outside public these trials are somewhat confusing. In order, therefore, to clear away any misconceptions, the Board of Admiralty have given this year in the Estimates, in a clear tabular form, the estimated speed of every vessel building, both at forced draught and natural draught on the measured mile, as well as her continuous sea-going speed under the favourable conditions of ordinary service. The coal capacity of the vessel and the distance she will cover are also given, as well as the estimated consumption of coal per hour, which forms the basis of the calculation. The latter calculation is still under revision.

Sea-going speeds.

Coal endurance.

Financial prospect of Naval Defence Act.

During the financial year 1889–90 the extraordinary activity displayed in shipbuilding and other industries for the mercantile marine has caused a remarkable rise in the price of the materials employed in shipbuilding, and of labour on contract-built ships.

Estimates with margin.

Under the Naval Defence Act the estimates of the cost of the work to be done were so framed as to allow a margin for rise in prices and other contingencies. This margin has, in many of the contracts made for hulls and machinery, been more than absorbed in consequence of the inflation of prices during the past year.

Actual cost of dockyard-built ship.

Of the ships building or to be built in the dockyards, their ultimate actual cost as compared with the estimates made last year must to a considerable extent be determined by the prices prevailing during the next three years. At present the tendency of business operations seems to indicate a fall in existing prices, but a reliable forecast is not at present practicable.

The Admiralty are not, therefore, in a position to say now whether

during the next three years further sums may not be required to satisfactorily carry out the work of completing and thoroughly equipping the seventy ships included in the programme of the Naval Defence Act. So soon as information is obtained, sufficient to justify an authoritative statement on the subject, a full communication will be made to Parliament. In the meantime the contracts made and liabilities incurred will be kept well within the authorised maximum.

Actual cost of ships in the Naval Defence Act.

During the past year the progress made in the manufacture and supply of guns for the Navy has been fairly satisfactory, and the number of new breech-loading guns (excluding small quick-firing and machine guns) completed by the manufacturers for naval service in the year ended 31st December, 1889, is 281, as compared with 160 completed in the year ended 31st December, 1888.

Naval ordnance.

This total of 281 is made up as follows:—

Nature of Gun.	No. issued.
16·25-inch of 110-tons	1
13½ " " 67 "	11
12 " " 45 "	1
10 " " 29 "	4
9·2 " " 22 "	10
6 " " 5 "	88
5 " " 40-cwt.	60
4·7 " (quick-firing)	37
4 " of 26-cwt.	69
Total	281

As regards the sufficiency of Naval Ordnance Stores to meet the requirements of the fleet, it may be mentioned that a considerable addition has been made to the reserve of ammunition, and considering the serious nature of the deficiency which existed when the Admiralty assumed the responsibility for the provision of Naval Armament, this fact is creditable to all concerned in bringing up the reserves to their present condition.

Naval Ordnance Stores.

UNCOMPLETED ORDERS FOR HEAVY B.L. GUNS.

Nature of Gun.	Old Orders.	New Orders.	Total.
16·25-inch 110-ton	3	3	6
13·5-inch 67-tons	8	40	48
10-inch 29-tons	5	16	21
9·2-inch 22-tons	9	28	37
	25	87	112

Large guns.

The preceding statement shows the number of heavy guns in course of manufacture, distinguishing old and new orders. It may be observed that, if the contract dates for delivery of the guns ordered for the ships included in the new programme are adhered to, the guns will be completed in ample time for the ships requiring them.

The magnitude of the task which has been accomplished in re-arming our fleet with breech-loading guns of the latest pattern, and the rapidity with which the work has been done, is shown by the following table:—

	No. of B. L. Guns, afloat and mounted.
31st March, 1881	Nil.
31st March, 1885	507
31st December, 1889	1293

Guns in reserve.

There were in addition, at the end of December, 1889, 169 B.L. guns in reserve, a number which during the last few weeks has been considerably increased. This is independent of the quick-firing guns of small calibre.

Serious delays in gun manufacture.

Nothwithstanding the great general advance thus shown, there have been serious delays, notably in the case of guns of heavy calibre in providing the armament of certain of our large battle-ships and cruisers. These difficulties are largely attributable to the unfortunate policy by which the Ordnance Select Committee was abolished in 1868, no steps being taken to supply its place till 1879. The experiments and accumulation of data necessary for the acquirement of technical knowledge to keep pace with the times were stopped for ten years, and when the adoption of breech-loading guns was eventually decided upon, it became necessary, in order to prevent delay in the completion of ships, to press on with the construction of the guns without those previous experiments which would have detected the weak points in their design. These difficulties have now been overcome, and it may be fairly hoped that no serious delay will hereafter occur in providing ships approaching completion with their necessary armament. The Trafalgar, the first large ship built under the new system, will be in commission, with all her equipment complete, within little more than four years from the date of her commencement.

Reserves.

Trafalgar's guns

Guns of Victoria.

During the past year the 110-ton guns forming the main armament of the Victoria and Sans Pareil have been subjected to a series of exhaustive proofs. One of the two guns of the original armament of the Victoria developed symptoms of a want of girder strength at proof, and after firing nearly ten tons of powder in further tests, was returned to the contractors. In the opinion both of the naval, military, and civil experts who examined the gun, it could have been

safely used on service had the necessity arisen, but as it was not a perfect gun it could not be accepted for the service of the Navy. The other gun did pass proof, but certain improvements were suggested as to its hooping. As two fresh guns embodying these improvements are available, both guns have gone back to the contractors for alterations.

Guns of battle-ships of recent design.

The present Board of Admiralty have substituted as the main armament of all the battle-ships they have laid down guns of a smaller calibre, for they consider the 110-ton gun too large and weighty for general use, though the introduction of a limited number of these heavy guns into the Naval Service was perfectly justifiable, as the gun was in existence, and was, so far as penetration and destruction are concerned, the most powerful weapon in the world. Three ships only will be armed with them.

The effective power of heavy guns.

In comparing the effective power of heavy guns there are two points to be considered:—

(*a*) Their ability to penetrate armour.
(*b*) The destructive power of their shell.

As the unarmoured portion of any armoured vessel is so considerable, and so far in excess of the armoured portion, the shell power of the gun is a most important consideration.

Now, in estimating the amount of damage which two shells will inflict, the generally accepted rule is that the damage done will vary as the squares of the bursting charges.

The 67-ton gun.

The 67-ton gun carries an armour-piercing projectile of 1250 lbs. weight, capable of penetrating at 1000 yards a steel plate of 24·3 inches in thickness, with a bursting charge of 85 lbs. in the common shell.

The 110-ton gun.

The 110-ton gun carries an armour-piercing projectile of 1800 lbs., capable at 1000 yards of penetrating 27·4 in. of steel, with a bursting charge of 180 lbs. in the common shell.

The 110-ton guns in the battle-ships.

Thus the proportionate damage which the bigger gun can inflict, as regards shell power, is in higher ratio to its weight than that of the lesser gun, for while the weight of the bursting charge of the shell in the one case is only about twice that of the other, the damage produced will be about four or five times as great. It seems, therefore, that in the absence of any data as to the results of a conflict between armour and guns afloat, our predecessors in office cannot in any way be blamed for giving to the British Navy the use of a very limited number of guns of this exceptional power, especially as the hydraulic mountings upon which they are placed are so effective and easily worked that there is little difference in the interval of fire between these guns and those weighing only 45 tons.

Benbow's guns.

The Benbow is at present the only vessel in commission armed with these guns. The latest report received from the officer commanding, dated February, 1890, states (the vessel having been in commission since June, 1888, and the guns have been periodically tried), that "the 110-ton guns do not show the slightest sign of any weakness in their construction, and the officers and men have complete confidence in them."

It is sometimes assumed that in the British Navy the heavy guns now forming the main armament of our fighting ships are of excessive calibre as compared with those in use in other navies. The following comparison between the heavy guns afloat in the French and English Navies disposes of this theory.

Numbers of large guns in French and English ships.

Total number of heavy B.L. guns of 8-inches calibre and upwards, of modern type, mounted in English and French ships:—

——	French.	English.
13-inch and upwards . . .	20	22
8-inch to 13-inch . . .	22	66
Total	42	88

NOTE.—Only guns of a length of bore of 20 calibres and over have been taken.

General approval of naval officers of guns supplied to H.M. ships.

Although some difference of opinion may exist amongst naval officers as to the calibre and weight of guns most suitable to individual ships, nothing but approval has been expressed as to the efficiency and quality of the guns provided. A careful comparison between the ballistics of our guns with those of foreign makers is in our favour.

It may, therefore, safely be asserted that in all the essentials that constitute an effective gun—accuracy and rapidity of fire, handiness, penetration, and durability—our guns are equal to any guns in existence.

The above opinion has not been hastily arrived at. Three years ago the failure of the 45-ton gun on board the Collingwood, the difficulties caused by the premature introduction of liners into new heavy guns, the want of reserves of ammunition, the lack of sufficient plant and machinery, and of satisfactory inter-communication between the War Office and Admiralty—caused considerable apprehension in the minds of the Admiralty as to how urgent naval wants could, under the existing system, be adequately met. The improvements that have since taken place are largely due to the personal superintendence and impulse which the Secretary of State for War himself has given to the enlargement and reform of the system he found in existence.

The Navy speak on ordnance questions as users of the articles supplied, but they are not responsible either for the design or manufacture of the weapons with which they are armed, except so far as gun-mountings and torpedoes are concerned. Every gun on board ship has, after it has passed proof, to be tried with full service charges by naval officers, to test the gun-mounting upon which it is placed. Every gun so passed, with its gun-mounting, is tested once a quarter when in commission, and the charges fired are heavier than those in use in other navies. The experience thus gained by naval officers during the past four years in the practical use of modern breech-loading guns is unique. The absolutely unanimous evidence of all so engaged is highly favourable to the quality of the guns they have been handling.

Torpedoes. During the year ended 31st December, 1889, 478 Whitehead torpedoes were manufactured and issued for the naval service. To meet the wants of the New Programme, the output will have to be considerably increased this year. A much more powerful torpedo has been adopted with successful results.

Torpedo discharge gear. The experiments with submerged torpedo-discharge apparatus, mentioned in last year's report, have been practically brought to a conclusion, and from the results of these experiments it has been decided to fit a considerable number of ships with this apparatus.

New works. The undermentioned new works have been completed since the date of the last statement:—

Works recently completed. Extension of Haulbowline Yard, New Foundry at Chatham Dockyard, Torpedo Range at Portsmouth, and accommodation for torpedo boats at Gibraltar.

Works in progress. During the present financial year the works connected with improved arrangements for coaling at Portsmouth and Portland have been commenced; the dredging of the channel in the river Medway is approaching completion, as are also the principal buildings for the Naval Barracks on Whale Island, which are already occupied by 400 men.

Halifax dry dock. The Dock subsidised by the Admiralty and built by private enterprise at Halifax is practically completed, and will accommodate any ship at present in the Navy.

Dock for Gibraltar. The Admiralty have been carefully considering the provision of a dock at Gibraltar, and have selected a site for it. They have every hope that the dock will soon be undertaken by private enterprise, with help and encouragement from the Imperial Government.

Plans for the proposed naval dock at Bombay have been prepared

New dock for Bombay. by Sir J. Coode, under instructions from the India Office, but no funds have as yet been allotted for the purpose.

The estimate for the New Works Vote for 1890–91 would have been considerably less than that for 1889–90, but that a sum of £49,290 has been charged to this Vote for storehouses and works constructed mainly by the War Department for Naval Ordnance Stores. This expenditure, over which the Admiralty has little or no control, has raised the total of the Estimate to £445,800, but even this is £5200 less than the amount voted for 1889–90.

Mobilisation and *personnel*. The various returns received during the last year, as well as the reports of inspections and the work of the manœuvres, all show that the discipline, efficiency, and health of the Navy are most satisfactory. The ratios of mortality and sickness are the lowest record since 1856.

Intelligence Department. Throughout the year both divisions of the Intelligence Department, as well as the executive departments of the Admiralty, have been engaged in improving our system of preparation for war. Some results of the past work of the Mobilisation Scheme were disclosed in the assembling of the Fleet for the Naval Inspection of the 5th August, and the subsequent manœuvres. It was decided to commission for the latter 50 vessels large and small, and 38 torpedo boats. On the 18th July, 44 vessels and the 38 torpedo-boats were put in commission. By the 23rd, or within five days, the torpedo-boats and 39 vessels, starting from the several Naval ports, had actually reached Spithead, where they were shortly after joined by the remainder, and where the Channel First Reserve and Training Squadrons also assembled. The Fleet thus formed comprised 73 ships and gunboats, and 38 torpedo-boats, with complements of more than 22,000 officers and men, of which the number "mobilised" amounted to nearly 16,000.

Naval Inspection of 1889.

In Naval Mobilisation, however, the assembling of the *personnel* is a matter of much less magnitude than the operations involved in the issue, moving, and embarkation of *matériel*, and the subsequent maintenance of supplies. The results of the arrangements made in anticipation of these operations were very satisfactory.

The *personnel* proved nearly adequate to the requirements. In several of the larger classes there were no deficiencies. The united engine-room complements of the mobilised ships amounted to more than 3500; and when the fleets put to sea there were only fourteen stokers of all rating short. The signal staff was more deficient; but the establishment had not long been increased, and time was of course required to complete the recruiting of the staff up to the higher numbers decided upon.

The value of the mobilisation of the Fleet is annually gauging how far the numbers on the active list are sufficient for the efficient manning of the Fleet cannot be over-estimated.

The alteration in the character, armament, and engine-power of new war-ships necessitates corresponding changes in the ratings and complements appropriated to the older types of war-vessels. Actual experience alone can prove the adequacy and suitability of the new complements provided. The reports of the officers in command give a mass of most valuable information on all these involved questions, and it is only by carefully noting and annually taking action upon the statements thus obtained that the ships in reserve can each be rapidly provided with a thoroughly effective complement. **Ratings and complements.**

A considerable addition to the numbers voted last year is now proposed, whilst additional inducements to join, as well as an increase of numbers, have been associated with the Royal Naval Reserve. These proposals are all part of the system by which an endeavour is year by year made to work up in advance the manning resources of the Navy to meet the requirements of the new ships completing or building, so that when a ship is equipped no delay may occur, for want of *personnel*, in its forming an effective part of the naval force of the country. **Additional men proposed.**

The increase of 3400 is mainly composed of engine-room artificers and stokers, the remainder being chiefly boys entered for training. **Composition of the increase.**

Out of the numbers proposed for 1890–91, provision is made, as before stated, for manning the special Australasian Squadron and certain ships and vessels of the Indian Government. The number required for this purpose is respectively 858 and 569 officers and men. **Australian and Indian ships.**

The steady and continuous development of the Fleet contemplated under the Naval Defence Act necessitates a careful consideration of the means by which the *personnel* can be simultaneously raised to meet the increased requirements of the Navy. The value of the Act, and of the principle it established, that shipbuilding should be regulated, not by the financial exigencies of any particular year, but by ascertained naval requirements embodied in an authorised programme spread over several years, would be nullified if, on the completion of the vessels thus authorised, they were found to be useless for want of crews. **A consequence of the Naval Defence Act.**

The establishment (independent of reserves and pensioners) will for the present year stand at 68,800, being an increase of 3400 over that of last year, and of 6400 over that which preceded it. The great **Number of men.**

majority of this force consists of continuous-service men, who ultimately retire upon pensions.

The permanent establishment not our only source of supply.

It would be unreasonable to expect that the whole of the extra force required for the next four years should be obtained simply by additions to the permanent establishment of the Navy. To the Naval Reserves we must therefore look to largely supply these prospective deficiencies. A steady development of this force, both of officers and men, side by side with a fixed annual augmentation of the numbers of blue-jackets and Marines, is the combination to be promoted.

Royal Naval Reserve.

At the close of 1888, when the effect of the Regulations of June, 1886, was beginning to be felt, there were on the Active List—

Lieutenants	59
Sub-Lieutenants	154
Midshipmen	140
Engineers and Assistant Engineers	32

Officers.

but it was found that the number of Lieutenants and Sub-Lieutenants did not grow in proportion to the needs of the Reserve, though there was a desirable class of officers serving in large steamship companies who were anxious to enter the Reserve, but who were debarred by the existing Regulations.

Two measures were therefore introduced by Order in Council, which—

1st, reduced the service-qualification of midshipmen for promotion in favour of those who had undergone a course of twelve months' training in a man-of-war at sea; and

2nd, relaxed the standard of qualification for the direct entry of sub-lieutenants by admitting 2nd and 3rd mates of large ocean-going passenger steamers, provided they had six years' service at sea, and had passed an examination for master.

The result has been that at the present time there are 202 sub-lieutenants on the List, fifty-one of whom have entered under the amended rules.

The Lieutenants' List has also been increased to 103, partly by promotion and partly by admitting direct from the Mercantile Marine a selection of candidates who fulfilled the ordinary requirements, and by giving to those sub-lieutenants who had undergone twelve months' naval training the advantage of allowing junior service in the Mercantile Marine to count as a qualification for promotion.

The following statement shows the number of officers now on the List, compared with the numbers at the end of 1888, and the number estimated for 1890, as well as the numbers in the different ranks who have had a year's naval training, or have cruised at sea in the Evolutionary Squadron :—

——	31 December, 1888.	31 December, 1889.	Estimated for 1890.
Lieutenants	59	103	135
Sub-Lieutenants	154	202	250
Midshipmen	140	173	200
Engineers and Assistant Engineers	32	66	100

Officers who have completed a year's training during 1889 :—

Lieutenants	6
Sub-Lieutenants	5
Midshipmen	2
	13

Officers who have completed their training this year, or are now under training :—

Lieutenants	15
Sub-Lieutenants	5
Midshipmen	4
	24
Total number of officers who have been trained or are under training	40

Officers, not under training, who have been through Excellent or Vernon since 31st December, 1888 :—

Lieutenants	6
Sub-Lieutenants	1
Midshipmen	1
	8

Officers, not under training, who served in Fleet during Summer Manœuvres, 1889 :—

Lieutenants	5
Sub-Lieutenants	7
Midshipmen	3
	15

Public spirit of ship-owners.

The public spirit of shipowners has contributed not a little to this satisfactory result by inducing their officers to join the Reserve, and by giving those already in the Reserve facilities to join the Navy for a year's training, or for other shorter periods of instruction. During 1889 the number of officers who came forward as candidates for the Reserve was very far in excess of the number in previous years.

Advantages of service at sea in H.M. ships to officers of Mercantile Marine.

Service at sea in H.M. ships has brought the officers of the Merchant Navy in touch with the officers of the Royal Navy, and, among other advantages, the training and experience of man-of-war life and naval discipline have unquestionably enhanced the value of the reserve of officers as a fighting force. In 1889, 37 officers either underwent or were undergoing twelve months' training at sea, and, in addition, 8 have undergone a course of twenty weeks' gunnery and torpedo training, and 15 have been appointed to H.M. ships for summer manœuvres: thus a total of 60 officers have actually served in Her Majesty's ships.

Seamen.

The numbers of 1st and 2nd Class Reserve have been kept up to the full number of 19,600, viz., 9600 1st class, and 10,000 2nd class. It is proposed to increase the 2nd class during the present year by 1000.

Firemen.

The number of firemen R.N.R. is slowly increasing. They now number 548 as against 439 at the beginning of 1889.

In order to give additional facilities for training the men, increased accommodation at existing batteries is being provided, and arrangements are in progress for placing new batteries at convenient centres round the coast to train the seafaring population.

Results.

On the whole, the result of the year has been extremely satisfactory, and there is no reason to doubt but that, in case of need, the regular forces maintained for the naval service of the country would be well supplemented and supported by the Royal Naval Reserve.

Royal Marines.

Nearly the whole of the additional numbers voted last year, viz., 1100, have been raised without difficulty, and without any appreciable difference in the class of recruits. It is expected that the whole of the extra number will be completed before the end of the financial year. A large proportion of those raised in the early part of the year have already finished their training at the depôt, and joined their divisions to complete their drills for service afloat.

Marine buglers.

The increased establishment of marine buglers formed in lieu of seamen bugler boys has been completed, and many of the new entries have been already embarked.

Efficiency.

The efficiency of the corps in all military drills and naval gunnery has been fully maintained, and instruction in military training, reconnaissance, and field-sketching carried out.

With regard to discipline, it is satisfactory to note that, as compared with past years, there is a general decrease of military offences, and a marked decrease in the number of cases of drunkenness. Discipline.

During the past year the regulations under which young officers on first entry joined their Divisional Head Quarters for training have been modified; the Infantry, equally with the Artillery, will now join the Royal Naval College at Greenwich, where they will have advantages not open to them under the old system. Young officers.

A large proportion of the corps were mobilised during the past year, the embarkations being effected with every despatch.

In addition to the naval ratings already held by marines, the corps has lately been called upon to furnish volunteers for the Sick Berth Staff, for which eligible candidates presented themselves without delay. Volunteers for sick berth staff.

A limited number of men of the Royal Marines will be trained in fleet signalling, to be employed if required as signalmen on board ship.

The experience of the Naval Medical Department during the past year has been most satisfactory. Naval Medical Service.

The competitions for the entry of surgeons have been productive of gratifying results.

It has been thought desirable, in the interests of the naval service, to establish a Board of Examiners, to be under the immediate control of the Admiralty, and independent of the Army, for the examination of candidates for entry into the medical branch of the Navy. The Admiralty accepted the generous offer of Sir Andrew Clark, the distinguished President of the Royal College of Physicians, to undertake gratuitously the Presidency of this Board, which is composed of the following eminent members of the medical profession:—Sir Dyce Duckworth, Lecturer and Physician of St. Bartholomew's Hospital: Sir W. MacCormac, Professor of Surgery at St. Thomas's Hospital; Mr. George Makins, Assistant-Surgeon and Lecturer at St. Thomas's Hospital; and Dr. Shore, Lecturer at St. Bartholomew's Hospital. Board of Examiners.

This change has necessitated the discontinuance of a system which had been in force for some years, and under which these examinations had been held conjointly with those for the Army and Indian services.

It was estimated that the 1889 Manœuvre Fleet would require 40,500 tons of coal. The quantity actually sent to and demanded by the officers in command during the manœuvres was 38,749 tons, or within 1750 tons of the estimate. Coals for manœuvres of 1889.

In all, 27 vessels were employed as colliers. Of these, 25 were taken up by the Contract Department for service during the actual progress of the manœuvres. Of the latter, several made more than one trip. A lieutenant was appointed to take charge of the coaling arrangements of each main fleet. These arrangements showed a marked advance over those of the preceding year, and it may be fairly asserted that the problem of supplying coal to a fleet rapidly moving from place to place has been partially solved.

An organised plan of collecting and distributing intelligence was worked by the Intelligence Department during the 1889 manœuvres with gratifying results. This indispensable element in an efficient system of preparation for war may be said to be secured.

Distribution of the Fleet.

Various changes and alterations in the strength and composition of the squadrons abroad and the Channel and the Mediterranean and reserve ships at home have been recently made.

The completion during the last two years of so large a number of battle-ships and cruisers has enabled the Admiralty to raise the effective strength of the Navy in commission by the substitution on distant stations of more powerful vessels as reliefs, and in the Mediterranean and home waters by changes of a much more important character.

Mediterranean Squadron.

The Mediterranean Squadron has been raised to a force of ten battle-ships and two belted cruisers. At this strength it will be permanently maintained.

Channel Squadron.

The Channel Squadron until quite recently has been looked upon as a training squadron, and has been composed of the older ironclads, broadside vessels fully rigged and capable of carrying large complements of men. It was assumed that these crews, or a portion of them, could, on an emergency, be turned over to the more modern ships which were in reserve. The experience, however, of the manœuvres has shown that the complexity and variety of the fittings and machinery of modern war vessels render it impracticable for any crew, however good their general training may be, to satisfactorily handle at the outset a new ship to which they have been hastily transferred.

Proposed squadron.

It has, therefore, been decided to alter the character and composition of the Channel Fleet by converting it into a squadron of modern ships of high speed and large coal endurance. At the return of the vessels now cruising this change will take place, and the squadron will hereafter consist of four armoured ships of the Admiral class and two belted cruisers.

The proposed substitution of four seagoing ironclads as flagships, in place of wooden hulks, in the four home ports, will be shortly completed. **Flagships for home ports.**

When these changes are carried out there will be, independently of the so-called Channel Squadron, a large force in the Channel and home waters available at very short notice for active service. **Large force available at short notice.**

1st. Four ironclads in commission as flagships at home ports. These vessels being fully commissioned, and having all their stores on board, will be ready at a few hours' notice.

2nd. The nine armour-clads in commission, and associated with the Coastguard system. The arrangements in connection with this reserve are such that they will be ready for sea in forty-eight hours.

3rd. The vessels in the 1st Class Steam Reserve in the home ports. On the 1st July they will comprise six ironclads, two belted cruisers, and sixteen cruisers, besides coast-defence vessels and gun and torpedo-boats. Under the mobilisation scheme, all these vessels should be ready for service in five days, and several of them—viz., those which act as tenders for the gunnery ships—in a much less time.

There are thus available from these sources, alone for the defence of home waters, within less than a week, nineteen ironclads (including those of the older type) and eighteen cruisers, besides small craft.

The Channel Squadron is, therefore, no longer specially required for the purposes implied by its name. This name it is not proposed to alter, Portsmouth and Devonport still continuing to be the head-quarters of the squadron. The Channel Squadron will, however, be available for other service if so required, and by its conversion into a powerful squadron, homogeneous in speed and coal endurance, the radius and rapidity of its action will be largely increased.

By thus distributing and grading our reserve ships we hope to ensure that the steps necessary to render them fit for sea can be taken rapidly, continuously, and without confusion, enabling us to bring up in successive lines a force at short notice, more than sufficient for the protection of our home waters.

II.

EXPLANATORY OBSERVATIONS ON THE NAVY ESTIMATES BY THE FINANCIAL SECRETARY.

Statements based upon the Navy Expense Accounts, furnishing particulars of the specific work upon which the labour and stores provided under the Estimates were to be applied, were attached as a tentative measure to the Estimates of each of the last two years.

Public Accounts Committee.

The Public Accounts Committee approved generally of this arrangement, but intimated that the particulars thus given should receive Parliamentary concurrence.

Army and Navy Audit Act.

With a view to comply with this suggestion, an Act was passed in the last Session, entitled the "Army and Navy Audit Act, 1889," under which the Expense Accounts of the Navy are to be submitted to the Controller and Auditor-General, whose duty it will be to audit the same, and to report to Parliament how far the estimated expenditure, as shown by the statement, which is to be called "The Programme," and attached to the Navy Estimates, has been fulfilled. Under the form in which "The Programme" is prepared, the state of the stock of naval stores will also have to be furnished and reported upon in each year.

Cost of new ships 1889-90.

It will be observed that the balance of expenditure in connection with new construction in 1889–90 is expected to fall short of the estimate, by £128,728. The sum thus unexpended will, under the provisions of the Naval Defence Act, be available for the services of 1890–91 without re-vote.

Estimates for new ships in 1890-91.

The total estimated expenditure upon new construction without armaments in 1890–91 is £6,551,031, exclusive of the cost of the Australasian squadron, made up as follows, viz., £2,955,101 for the ships building and completing in Her Majesty's dockyards, and £3,595,930 upon the vessels constructing by contract, which is to be defrayed out of the special fund created under the Naval Defence Act, and is not included in the ordinary estimates. The expenditure on the dockyard-built vessels is to be met out of the unexpended balances of 1889–90—from the votes and stores provided in 1890-91—and by advances under the provisions of the Naval Defence Acts.

Annual depreciation of the Fleet.

The usual table showing the estimated annual depreciation of the Fleet, having regard to the number and cost of the ships completed,

including the Sans Pareil, on 1st April 1890, is appended, which shows the wastage to be £2,048,095.

Divine Service Vote.

The Divine Service Vote, hitherto appearing as a separate vote, is merged into other votes, and the non-effective Votes are divided into three instead of five Votes. A note is appended to each Vote affected showing the alteration consequent on the change.

New works and buildings.

Vote 10 for Works includes a new sub-head for estimated expenditure in connection with the storage and manipulation of ordnance stores.

Payment for the Australian ships.

A Vote to meet the first annuity payable in respect of the cost of construction of the vessels completing for the Australasian Squadron is introduced, in which credit has been taken on account of the subsidies due from the Colonies.

III.—Abstract of Navy

Votes.		Estimates, Gross Estimate.	Estimates, Appropriations in Aid.
	I. Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coastguard, and Royal Marines	....	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coastguard, and Royal Marines	3,440,023	127,523
2	Victualling and Clothing for the Navy	1,388,186	284,986
3	Medical Establishments and Services	144,030	18,830
4	Martial Law	11,924	24
5	Educational Services	92,091	20,291
6	Scientific Service	67,185	9,285
7	Royal Naval Reserves	152,136	36
8	Shipbuilding, Repairs, Maintenance, &c.:		
..	Section I.—Personnel	1,682,750	23,450
..	Section II.—Materiel	1,854,000	184,000
..	Section III.—Contract Work	1,309,900	9,200
9	Naval Armaments	1,465,100	1,600
10	Works, Buildings, and Repairs at Home and Abroad	453,100	7,300
11	Miscellaneous Effective Services	136,142	2,742
12	Admiralty Office	229,020	8,520
	Total Effective Services £	12,425,587	697,787
	III.—Non-Effective Services.		
13	Half Pay, Reserved, and Retired Pay.	796,855	3,355
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	938,476	5,076
15	Civil Pensions and Gratuities	332,738	2,038
	Total Non-Effective Services £	2,068,069	10,469
	IV.—Extra Estimate for Services in connection with the Colonies.		
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under	64,200	63,000
	Grand Total £	14,557,856	771,256

Estimates for 1890–91.

1890–91.	*Estimates, 1889–90.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers.			Total Numbers.	Numbers.	Numbers.	
68,800	....	....	65,405	3,395	....	A.
£	£	£	£	£	£	
3,312,500	3,325,993	103,356	3,222,637	89,863	....	1
1,103,200	1,339,609	278,509	1,061,100	42,100	....	2
125,200	142,707	19,330	123,377	1,823	....	3
11,900	11,944	44	11,900	....	....	4
71,800	92,194	20,180	72,014	....	214	5
57,900	69,198	11,298	57,900	....	....	6
152,100	147,575	75	147,500	4,600	....	7
						8
1,659,300	1,644,844	21,100	1,623,744	35,556	....	Sec. I.
1,670,000	1,678,500	203,000	1,475,500	194,500	....	Sec. II.
1,300,700	1,565,000	....	1,565,000	....	264,300	Sec. III.
1,463,500	1,463,500	....	1,463,500	....	....	9
445,800	457,000	6,000	451,000	....	5,200	10
133,400	135,538	2,750	132,788	612	....	11
220,500	226,360	8,520	217,840	2,660	....	12
11,727,800	12,299,962	674,162	11,625,800	371,714	269,714	
793,500	797,441	41	797,400	....	3,900	13
933,400	926,215	215	926,000	7,400	....	14
330,700	338,192	1,992	336,200	....	5,500	15
2,057,600	2,061,848	2,248	2,059,600	7,400	9,400	
1,200	....	....	....	1,200	....	16
13,786,600	14,361,810	676,410	13,685,400	380,314	279,114	

Net Increase £101,200

* The Divine Service Vote is absorbed in these figures in order to afford a correct comparison.

STATEMENT showing the Actual and Estimated EXPENDITURE for NAVAL SERVICES for the Three Years ending the 31st March, 1891.

		£	s.	d.
1888-89	Estimated Expenditure (after deducting Appropriations in Aid)	13,082,800	0	0
	Supplementary Estimate (13th March, 1889)	45,000	0	0
		13,127,800	0	0
	Net Expenditure, as per Final Account	12,934,641	5	4
	Net Surplus (Expenditure less than Estimate)	£193,158	14	8
1889-90	Estimated Expenditure (after deducting Appropriations in Aid)	£13,685,400	0	0
1890-91	Estimated Expenditure (after deducting Appropriations in Aid)	£13,786,600	0	0

STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1889–90 and those for 1890–91.

INCREASES.		£
Wages, &c. of Officers, &c.		116,000
Victualling and Clothing		49,000
Medical Establishments and Services		2,000
Royal Naval Reserves		4,600
Wages of Artificers in Dockyards		42,300
Naval Stores (including Coal)		158,500
Decrease in Amount of Receipts arising from the Sale of Ships		42,000
Repairs, &c., of Ships by Contract		9,200
Machinery for Shore Establishments (Contract)		11,300
Royal Reserve of Merchant Cruisers		2,800
Naval Armaments		1,600
Salaries, Admiralty Establishments		2,660
Non-Effective Services		6,000
Annuity to repay Cost of Australasian Squadron		64,200
		512,160
DECREASES.	£	
Contribution towards Expenses of Manning the Floating Defences of Indian Harbours	58,000	
Contribution from Colonies towards Cost and Maintenance of Australasian Squadron	63,000	
Increase in Contribution paid by the War Department for use of Her Majesty's Troop Ships	3,750	
Machinery for Her Majesty's Ships (Contract) including Inspection of Contract Work	133,400	
Hulls of Ships Building by Contract	74,500	
Gun Mountings (Contract)	70,500	
Works, Buildings, &c.	5,200	
Miscellaneous Items	2,610	410,960
Net Increase	£	101,200

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

		1890–91.	1889–90.
NAVY ESTIMATES:		£	£
Estimated Expenditure (after deducting Appropriations in Aid)		13,786,600	13,685,400
CIVIL SERVICE ESTIMATES:			
Estimated Expenditure under—			
Class I. Vote 3.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c. . . .	2,660		
Rents, Insurance, Tithes, &c. .	4,000		
Fuel, Light, Water, &c.	2,950		
Furniture . .	1,400		
		11,010	10,150
Class I. Vote 4.—Admiralty, Extension of Buildings		25,000	5,000
„ I. „ 9.—Surveys of the United Kingdom		100	100
„ I. „ 13.—Rates on Government Property.		51,000	51,000
„ I. „ 14.—Public Buildings, Ireland:			
Coast Guard, viz.:			
New Works and Alterations .	£ 8,554		
Maintenance and Supplies . .	5,141		
Furniture, Fittings, &c.	250		
	£13,945		
Naval Reserve .	..		
		13,945	14,050
Class II. Vote 13.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Store and Cash Accounts .	8,834		
Expense and Manufacturing Accounts	6,086		
		14,920	10,649*
„ II. Vote 23.—Stationery and Printing . .		50,750	48,500
„ III. „ 1.—Law Charges, England (Net) .		2,840	2,809
„ III. „ 7.—Prisons, England:			
Maintenance of Naval Prisoners		1,214	1,392
„ III. „ 13.—Prisons, Scotland . . .		50	55
„ III. „ 20.—Prisons, Ireland . . .		59	73
REVENUE DEPARTMENTS:			
Post Office.—Postage of Official Correspondence . .		10,580	13,065
„ Official Telegrams		4,716	4,716
GREENWICH HOSPITAL FUNDS		3,044	3,098
Total		13,975,648	13,850,057

* Exclusive of the cost of the audit of the Navy Expense and Manufacturing Accounts.

VOTE 8.*

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required in the YEAR ending 31st March, 1891, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—One Million Six Hundred and Fifty-nine Thousand Three Hundred Pounds.

(£1,659,300.)

SECTION II.—MATERIEL.—One Million Six Hundred and Seventy Thousand Pounds.

(£1,670,000.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—One Million Three Hundred Thousand Seven Hundred Pounds.

(£1,300,700.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

	Estimates. 1890–91.	Estimates. 1889–90.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances . . .	158,817†	164,094	..	5,277
B.—Wages, &c., of Men, and hire of Teams	1,285,874	1,245,773	39,601	..
C.—Wages, &c., of Police Force . .	35,722	35,684	38	..
D.—Contingencies	4,300	4,300	..	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	48,054†	47,090	964	..
F.—Wages, &c., of Men, and hire of Teams	138,266	135,580	2,686	..
G.—Wages, &c., of Police Force . .	11,340	11,430	..	90
H.—Contingencies	877	893	..	16
£	1,682,750	1,644,844	43,289	5,383
Deduct—				
I.—Appropriations in Aid	23,450	21,100	2,350	..
£	1,659,300	1,623,744	40,939	5,383
		Net Increase .	£35,556	

* This Vote comprises, under both years, the following items formerly provided under Vote 6, "Divine Service," viz., Salaries of Chaplains employed in the Dockyards and Contingencies (part of).

† These amounts include the sums of £19,685 and £1,240 for pay of Inspectors of Shipwrights at Home and Abroad respectively, which is charged direct to the cost of shipbuilding, *see* Programme, page 338. For the Shipbuilding Programme, *see* page 338.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATERIEL, of the Vote will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1890–91.	1889–90.		
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATERIEL.				
Naval Stores.				
A.—Timber, Masts, Deals, &c. . .	113,200	147,500	..	34,300
B.—Metals and Metal Articles . .	729,530	640,000	9,530	..
C.—Coals for Yard purposes . . .	56,000	38,500	17,500	..
D.—Hemp, Canvas, &c.	95,000	107,000	..	12,000
E.—Paint materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles. . .	235,000	233,000	2,000	..
F.—Electrical, Torpedo, and other Apparatus	90,000	93,000	..	3,000
G.—Coals for Steam Vessels . . .	480,000	366,000	114,000	..
H.—Freight.	28,000	33,500	..	5,500
I.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad . .	8,955	11,715	..	2,760
K.—Gas, &c., Dockyards at Home, and Naval Yards Abroad . . .	8,315	8,285	30	..
£	1,854,000	1,678,500	233,060	57,560
Deduct—				
L.—Appropriations in Aid . . .	184,000	203,000	..	19,000
£	1,670,000	1,475,500	233,060	38,560
	Net Increase .		. £194,500	

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1890-91.	1889-90.		
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for Her Majesty's Ships and Vessels . .	711,198	871,940	..	160,742
B.—Auxiliary Machinery for Her Majesty's Ships and Vessels . .	74,230	41,900	32,330	..
C.—Hulls of Ships, &c., Building by Contract	137,101	211,636	..	74,535
D.—Purchase of Ships, Vessels, &c. .	..	..	..	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	34,200	25,000	9,200	..
F.—Inspection of Contract Work . .	10,000	15,000	..	5,000
G.—Gun Mountings and Torpedo Carriages and Gear	236,971	307,454	..	70,483
H.—Machinery for Her Majesty's Shore Establishments at Home and Abroad	64,000	52,660	11,340	..
I.—Royal Reserve of Merchant Cruisers.	42,200	39,410	2,790	..
£	1,309,900	1,565,000	55,660	310,760
Deduct,—				
K.—Appropriations in Aid . . .	9,200	..	9,200	..
£	1,300,700	1,565,000	46,460	310,760
	Net Decrease . .		£264,300	

VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the Sum which will be required in the Year ending the 31st March, 1891, to defray the EXPENSE of NAVAL ARMAMENTS.

One Million Four Hundred and Sixty-three Thousand Five Hundred Pounds.

(£1,463,500.)

II.—SUB-HEADS under which this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1890-91.	1889-90.		
	£	£	£	£
A.—Guns	410,000	413,000	..	3,000
B.—Projectiles and Ammunition .	557,671	660,000	..	102,329
C.—Torpedoes and Gun Cotton .	90,000	110,000	..	20,000
D.—Small Arms and Miscellaneous	292,170	185,241	106,929	..
E.—Inspection, Storage, &c. . .	70,000	70,000	..	..
EE.—Additional Floating Magazines	20,000	..	20,000	..
F.—Freight and Incidental Charges	25,259	25,259	..	..
£	1,465,100	1,463,500	126,929	25,329
Deduct,—				
G.—Appropriations in Aid . .	1,600	..	1,600	..
£	1,463,500	1,463,500	125,329	125,329

NOTE.—1. A separate Statement will be issued showing the Total Estimated Cost of Naval Armaments included in Vote 9, and the Amounts provided for this Service under other Votes.

2. The sum of £600,000 has been provided in this Estimate for the Armament of Dockyard-Built Vessels, under the provisions of the Naval Defence Act of 1889.

IV.

1890–91.

PROGRAMME OF WORKS IN PROGRESS ON SHIPS BUILDING &c., IN HER MAJESTY'S DOCKYARDS AND BY CONTRACT.

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET
REPAIRS, MAINTENANCE, &c.,

SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Sec. 1 (2), ARMY

	ESTIMATES. Direct Expenditure. Dockyard Work. Personnel, Sec. I.	Matériel, Sec. II.	Contract Work, Sec. III.	Total.	Under Section I. (3), of Naval Defence Act (1889.)*
NEW CONSTRUCTION:	£	£	£	£	£
Dockyard-Built Ships:					
Old Programme (Naval Defence Act, Sec. 3 (1)) . . .	89,290	49,040	182,824	321,154	..
New Programme (Naval Defence Act, Sec. 1 (3)) . . .	600,400	942,360	863,727	2,406,487	..
Contract-Built Ships:					
Old Programme (Naval Defence Act, Sec. 3 (1)) . . .	8,200	8,600	146,370	163,170	..
A.—TOTAL	**697,890**	**1,000,000**	**1,192,921**	**2,890,811**	..
Contract-Built Ships:					
B.—New Programme (Naval Defence Act, Sec. 1 (3))	..	..	..	..	3,595,930
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	**697,890**	**1,000,000**	**1,192,921**	**2,890,811**	**3,595,930**
Deduct,— *Balances in Cash, and Value of Stores unexpended in* 1889–90, *and available in* 1890–91, *under Naval Defence Act, Sec.* 3 (2) .	. . .	. . .	. . .	*128,728*	
Balance to be provided for in 1890–91	. . .	. . .	. . .	† *2,762,083*	
C.—NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard-Built	260	460	..	720	..
Contract-Built	1,740	1,540	60,290	63,570	..
TOTAL	2,000	2,000	60,290	64,290	..
TOTAL—NEW CONSTRUCTION ‡ (excluding Ships building under Imperial Defence Act)	**699,890**	**1,002,000**	**1,253,211**	**2,955,101**	**3,595,930**
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c.	..	..	..	985,174	..
E.—SEA STORES, COALS, &c. .	..	..	..	833,000	..
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	..
				4,773,275	**3,595,930**

* Excluding Guns, Torpedoes and Ammunition.
† Including the value of Armour Plates, &c., to be purchased under Section 3 (3) of the Naval Defence Act.
‡ For Grand Total New Construction, including Ships building under Imperial Defence Act, see pp.

VALUE OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1890–91.

accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

1890–91.			1889–90.			Difference between Direct Expenditure, 1889–90 (B) and 1890–91 (A)	
Total Direct Expenditure. (A)	Establishment, &c. Charges apportioned.	Aggregate, 1890–91.	Direct Expenditure. (B)	Establishment, &c. Charges, apportioned.	Aggregate, 1889–90.	Increase.	Decrease.
£	£	£	£	£	£	£	£
321,154	23,825	344,979	902,949	96,966	999,915	..	581,795
2,406,487	197,486	2,603,973	1,282,501	115,594	1,398,095	1,123,986	..
163,170	4,043	167,213	352,367	12,318	364,685	..	189,197
2,890,811	**225,354**	**3,116,165**					
3,595,930	..	3,595,930	749,164	..	749,164	2,846,766	..
6,486,741	**225,354**	**6,712,095**	**3,286,981**	**224,878**	**3,511,859**		
720	..	720	3,609	..	3,609	..	2,889
63,570	1,281	64,851	91,970	3,656	95,626	..	28,400
64,290	1,281	65,571	95,579	3,656	99,235		
6,551,031	**226,635**	**6,777,666**	**3,382,560**	**228,534**	**3,611,094**	**3,168,471 (net).**	..
985,174	100,296	1,085,470	835,755	90,536	926,291	149,419	..
833,000	36,130	869,130	626,550	39,224	665,774	206,450	..
..	937,196	937,196	7,941	945,855	953,796	..	7,941
8,369,205	**1,300,257**	**9,669,462**	**4,852,806**	**1,304,149**	**6,156,955**		

NET INCREASE ON DIRECT EXPENDITURE . . £3,516,399.

SHIPBUILDING, RE-CONSTRUCTION, REPAIRS, MAINTENANCE, &c., ESTIMATED EXPENDITURE.

STATEMENT showing the Estimated Distribution of the Aggregate Expenditure in Cash and in Net Values of Stores issued from Stock, including Establishment and Incidental Charges, in connection with the Programme of Naval Construction, Re-construction, Repairs, and Miscellaneous Services, arranged under the Sub-Heads &c., under which the Expenditure will be accounted for in the Navy Expense Accounts, under the provisions of Sec. 1 (2), Army and Navy Audit Act, 1889.

SECTION I.—PERSONNEL. HEADS OF EXPENDITURE.		ESTIMATED EXPENDITURE.		ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.									
				Naval Construction.					Manufactures (including Repairs).		Establishment and Incidental Charges Unapportioned to Ships, &c.		
					Re-construction, Repairs, Alterations, and Refits.								
		Charged direct as Incurred.	Establishment and Incidental Charges Apportioned.	New Construction.	Ships Re-constructing.	Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.	Stores for Ships, Coals for Steaming, &c.	Gun Mountings, Torpedo Carriages, Gear, &c.	Naval Stores, &c.	Fleet, Port, National and Unappropriated Charges.	Unappropriated (Haulbowline, Deptford, and Naval Yards Abroad).	Total Amount of Estimated Expenditure.
		(a.)	(b.)	(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)	(l.)	(m.)
DOCKYARD WORK.		£	£	£	£	£	£	£	£	£	£	£	£
SALARIES OF THE DEPARTMENT OF THE CONTROLLER OF THE NAVY (Vote 13) proportion of, attributable to Dockyard Work		..	28,075	10,415	699	1,528	2,083	2,222	103	286	6,939	3,800	28,075
PENSIONS (Vote 18) ditto ditto		..	6,666	1,042	70	153	208	222	10	29	4,552	380	6,666
TOTAL, ADMIRALTY £		..	34,741	11,457	769	1,681	2,291	2,444	113	315	11,491	4,180	34,741
DOCKYARDS AT HOME.													
SALARIES AND ALLOWANCES (Vote 8, Sec. 1, Sub-Head A.), Exclusive of Pay of Inspectors, £19,685 (*)		..	139,132	54,388	4,321	8,620	12,234	6,907	410	3,146	46,035	3,071	139,132
EMOLUMENTS PAID OUT OF OTHER VOTES		..	1,674	..	..	..	..	..	..	..	1,674	..	1,674
PENSIONS OF OFFICERS ON THE RETIRED LIST (Vote 18)		..	42.617	5,439	432	862	1,223	691	41	315	33,307	307	42,617
WAGES, &c., OF MEN AND HIRE OF TEAMS:—	£												
Upon Ships, &c. Construction, Re-construction, Maintenance, &c.	1,007,238	1,007,238	..	672,653	53,000	112,092	169,493	..	..	..	..	..	1,325,059
Upon Ships, &c. New Propelling and other Machinery	43,977	43,977	..	26,977	17,000	..	..	..	..	..	..	..	
Upon Tugs and Yard Craft Maintenance	6,985	6,985	..	..	..	..	6,985	..	..	..	..	..	
Upon Tugs and Yard Craft Pay, &c. of Crews	19,924	..	19,924	..	..	..	..	..	..	..	19,924	..	
Upon *Manufactures*	66,680	66,680	..	..	..	..	..	..	7,700	18,980	..	..	
Upon Yard Services	70,577	..	70,577	11,049	909	1,754	2,526	1,287	89	679	51,199	1,085	
Upon Storekeeping	59,602	..	59,602	22,610	853	3,504	3,834	15,900	12	95	7,697	5,097	
Upon Repairs, Storage, &c., of Torpedoes	8,166	..	8,166	..	..	..	..	..	..	..	8,166	..	
Upon Yard Machinery New	6,006	..	6,006	1,664	167	267	420	..	18	140	3,180	150	
Upon Yard Machinery Repairs	30,754	..	30,754	8,431	844	1,351	2,127	..	93	711	16,997	200	
Upon Experiments	5,150	..	5,150	..	..	..	..	..	..	..	5,150	..	
Total, inclusive of Pay of Inspectors £	(†) 1,325,059												

CIVIL PENSIONS OF WORKMEN (Vote 18)		..	145,931	27,391	2,741	4,389	6,910	..	301	2,310	101,689	200	145,931
MEDICINES, &c. (Vote 3)		..	225	131	13	21	33	..	2	11	9	5	225
WAGES, &c., OF POLICE FORCE (Vote 8, Sec. 1, Sub-Head C.)		..	35,722	..	..	..	..	..	..	..	35,456	266	35,722
PENSIONS OF POLICE FORCE (Vote 18)		..	3,960	..	..	..	..	..	..	..	3,960	..	3,960
CONTINGENCIES, DOCKYARDS AT HOME (Vote 8, Sec. 1, Sub-Head D.)		..	4,300	1,578	108	249	333	305	9	70	1,533	115	4,300
TOTAL, DOCKYARDS AT HOME	£	1,124,880	573,740	832,311	80,388	133,109	206,118	25,090	8,675	66,457	335,976	10,496	1,698,620
NAVAL YARDS ABROAD.													
SALARIES AND ALLOWANCES (Vote 8, Sec. 1, Sub-Head E.), Exclusive of Pay of Inspectors, £1,240. (*)		..	46,814	..	..	..	..	..	..	..	..	46,814	46,814
EMOLUMENTS PAID OUT OF OTHER VOTES		..	55	..	..	..	..	..	..	..	..	55	55
PENSIONS OF OFFICERS ON THE RETIRED LIST (Vote 18)		..	6,416	..	..	..	..	..	..	..	..	6,416	6,416
WAGES, &c., OF MEN AND HIRE OF TEAMS:—	£												
Ships, &c.—Construction, Maintenance, &c.	64,365	64,365	..	260	..	27,360	36,745	..	..	..	..	..	
Tugs and Yard Craft { Maintenance	4,450	4,450	..	..	..	..	4,450	..	..	..	..	..	
Tugs and Yard Craft { Pay, &c., of Crews	8,134	..	8,134	..	..	..	..	..	..	..	..	8,134	
Manufactures	6,750	6,750	..	..	..	..	..	..	..	6,750	..	..	
Upon . . Yard Services	18,466	..	18,466	..	..	..	..	..	..	..	..	18,466	139,506
Storekeeping	19,366	..	19,366	..	..	..	..	..	..	..	..	19,366	
Repairs, Storage, &c., of Torpedoes	4,183	..	4,183	..	..	..	..	..	..	..	..	4,183	
Yard Machinery { New	1,436	..	1,436	..	..	..	..	..	..	..	..	1,436	
Yard Machinery { Repairs	12,356	..	12,356	..	..	..	..	..	..	..	..	12,356	
Total, inclusive of Pay of Inspectors.	£(†) 139,506												
CIVIL PENSIONS OF WORKMEN, &c. (Vote 18)		..	4,590	..	..	..	..	..	..	..	..	4,590	4,590
MEDICINES. &c. (Vote 3)		..	42	..	..	..	..	..	..	..	..	42	42
WAGES, &c., OF POLICE FORCE (Vote 8, Sec. 1, Sub-Head G.)		..	11,340	..	..	..	..	..	..	..	..	11,340	11,340
PENSIONS OF POLICE FORCE (Vote 18)		..	44	..	..	..	..	..	..	..	..	44	44
CONTINGENCIES (Vote 8, Sec. 1, Sub-Head H.)		..	877	..	..	..	..	..	..	..	..	877	877
TOTAL, NAVAL YARDS ABROAD		£75,565	134,119	260	..	27,360	41,195	..	..	6,750	..	134,119	209,684
TOTAL YARDS AT HOME AND ABROAD, &c.		£1,200,445	742,600	844,028	81,157	162,150	249,604	27,534	8,788	73,522	347,467	148,795	1,943,045
Deduct,— Value of Labour expended upon the Manufacture of Stores, and included in the issuing prices thereof under "Matérial" (Section 2)		73,430		..	..	..	..	..	7,700	65,730	..	..	73,430
TOTAL, carried to **RECAPITULATION**		£1,127,015	742,600	844,028	81,157	162,150	249,604	27,534	‡ 1,088	‡ 7,792	§347,467	148,795	1,869,615

* Pay of Inspectors of Shipwrights included in the "Wages, &c., of Men, &c.," and distributed as direct charges.
† Exclusive of an Estimated Expenditure of £108,485 for Indian and Colonial Governments, &c., on repayment as incurred.
‡ Proportion of Establishment, &c., Charges incidental to Manufactures which cannot be included in the issuing prices, *vide* Sec. 6 (1) of Naval Defence Act.
§ The Indirect Expenditure appertaining to Ships constructing by Contract under the Naval Defence Act is included under the "Unappropriated Charges."

SECTION II.—MATÉRIEL.

HEADS OF EXPENDITURE.		Estimated Expenditure: Charged direct as Incurred. (a.)	Estimated Expenditure: Establishment and Incidental Charges Apportioned. (b.)
DOCKYARD WORK.			
DOCKYARDS AT HOME.			
NAVAL STORES, &c., TO BE WITHDRAWN FROM STOCK (NET):—	£	£	£
For Supplies to and Work upon: Ships, &c.: Construction, Re-construction, Maintenance, &c.	1,479,035	1,479,035	..
For Supplies to and Work upon: Ships, &c.: New Propelling and other Machinery	22,325	22,325	..
For Supplies to and Work upon: Ships, &c.: Coals for Steaming	89,000	89,000	..
Tugs and Yard Craft, Maintenance	6,800	6,800	..
Yard Services	28,537	..	28,537
Storekeeping	20,805	..	20,805
Repairs, Storage, &c., of Torpedoes	1,950	..	1,950
Yard Machinery: New	4,292	..	4,292
Yard Machinery: Repairs	11,309	..	11,309
Experiments	5,570	..	5,570
Total . . . . £	1,669,693*		
FREIGHT, &c., (Vote 8, Sec. 2, Sub-Head H.)		..	3,700
RENTS, WATER, &c. (Vote 8, Sec. 2, Sub-Head I.)		..	7,626
GAS, &c. (Vote 8, Sec. 2, Sub-Head K.)		..	8,260
BUILDINGS, DOCKS, &c., New Works and Maintenance, Vote 10		..	163,180
TOTAL, DOCKYARDS AT HOME . . . £		**1,597,160**	**255,229**
NAVAL YARDS ABROAD.			
NAVAL STORES, &c., TO BE WITHDRAWN FROM STOCK (NET):—	£		
For Supplies to and Work upon: Ships, &c.: Construction, Maintenance, &c.	151,420	151,420	..
For Supplies to and Work upon: Ships, &c.: Coals for Steaming	374,000	374,000	..
Tugs and Yard Craft, Maintenance	3,560	3,560	..
Yard Services	9,321	..	9,321
Storekeeping	3,051	..	3,051
Repairs, Storage, &c., of Torpedoes	1,260	..	1,260
Yard Machinery: New	778	..	778
Yard Machinery: Repairs	4,067	..	4,067
Total . . . . £	547,457*		
FREIGHT, &c. (Vote 8, Sec. 2, Sub-Head H.)		..	24,300
RENTS, WATER, &c. (Vote 8, Sec. 2, Sub-Head I.)		..	2,059
GAS, &c. (Vote 8, Sec. 2, Sub-Head K.)		..	815
BUILDINGS, DOCKS, &c., New Works and Maintenance, Vote 10		..	109,585
TOTAL, NAVAL YARDS ABROAD . . £		**528,980**	**155,236**
TOTAL YARDS AT HOME AND ABROAD . . £		**2,126,140**	**410,465**
Add,—			
NEW YARD MACHINERY Purchased by **CONTRACT**: Dockyards at Home		..	..
NEW YARD MACHINERY Purchased by **CONTRACT**: Naval Yards Abroad		..	..
TOTAL, carried to **RECAPITULATION** . . . £		**2,126,140**	**410,465**

* Exclusive of an Estimated Expenditure of £86,000 for other Departments of the Home Government, Indian, Colonial, and Foreign Governments, and Miscellaneous, on repayment; and of Stores to be sold, included in the Appropriations-in-Aid of Vote 8, Section 2.

SECTION II.—MATÉRIEL.

ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.

Naval Construction.					Manufactures (including Repairs).		Establishment and Incidental Charges Unappropriated to Ships, &c.		
	Re-construction, Repairs, Alterations, and Refits.								
New Construction.	Ships Re-constructing.	Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.	Stores for Ships and Coals for Steaming, &c.	Gun Mountings, Torpedo Carriages, Gear, &c.	Naval Stores, &c.	Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad.)	Total Amount of Estimated Expenditure.
(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)	(l.)	(m.)
£	£	£	£	£	£	£	£	£	£
984,215	18,000	103,300	107,020	266,500	..	..	..	..	1,479,035
17,325	5,000	..	..	..	..	..	..	..	22,325
..	..	..	..	89,000	..	..	..	..	89,000
..	..	..	3,300	3,500	..	..	..	..	6,800
3,443	291	547	797	367	29	221	22,292	550	28,537
7,053	485	1,111	1,488	3,217	41	312	1,568	5,530	20,805
..	..	..	..	..	..	..	1,950	..	1,950
1,219	122	195	308	..	13	103	2,262	70	4,292
3,077	308	493	776	..	33	259	6,263	100	11,309
..	..	..	..	..	..	..	5,570	..	5,570
1,064	37	164	175	430	..	..	80	1,750	3,700
2,888	199	456	608	558	17	127	2,773	..	7,626
3,054	210	481	643	591	18	134	3,129	..	8,260
31,148	2,559	4,944	7,119	3,433	249	1,911	105,247	6,570	163,180
1,054,486	**27,211**	**111,691**	**122,234**	**367,596**	**400**	**3,067**	**151,134**	**14,570**	**1,852,389**
460	..	22,400	29,560	99,000	..	..	..	..	151,420
..	..	..	..	374,000	..	..	..	..	374,000
..	..	..	2,560	1,000	..	..	..	..	3,560
..	..	..	..	..	..	..	..	9,321	9,321
..	..	..	..	..	..	..	..	3,051	3,051
..	..	..	..	..	..	..	..	1,260	1,260
..	..	..	..	..	..	..	..	778	778
..	..	..	..	..	..	..	..	4,067	4,067
..	..	..	..	..	..	..	..	24,300	24,300
..	..	..	..	..	..	..	..	2,059	2,059
..	..	..	..	..	..	..	..	815	815
..	..	..	..	..	..	..	..	109,585	109,585
460	..	**22,400**	**32,120**	**474,000**	..	..	..	**155,236**	**684,216**
1,054,946	**27,211**	**134,091**	**154,354**	**841,596**	**400**	**3,067**	**151,134**	**169,806**	**2,536,605**
13,341	1,335	2,138	3,366	..	147	1,125	28,432	2,500	See Section
..	..	..	..	..	..	..	..	11,345	III. p. 438.
1,068,287	**28,546**	**136,229**	**157,720**	**841,596**	**547***	**4,192***	**179,566**	**183,651**	**2,536,605**

* Proportion of Establishment, &c., Charges, incidental to Manufactures which cannot be included in the Issuing Prices, *vide* Section 6 (1) of Naval Defence Act.

SHIPBUILDING, RE-CONSTRUCTION, REPAIRS, MAINTENANCE, &c.

SECTION III.—CONTRACT WORK.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE.	
	Charges direct as Incurred. (a.)	Establishment and Incidental Charges Apportioned. (b.)
CONTRACT WORK.	£	£
SALARIES OF THE DEPARTMENT OF THE CONTROLLER OF THE NAVY (Vote 13), proportion of, attributable to Contract Work	..	28,175
PENSIONS (Vote 18) ditto ditto	..	2,817
PROPELLING AND OTHER MACHINERY FOR HER MAJESTY'S SHIPS AND VESSELS (Vote 8, Sec. 3, Sub-Head A.)	990,180	..
OTHER (AUXILIARY) MACHINERY, NOT INCLUDED IN THE CONTRACT PRICE OF SHIPS OR PROPELLING MACHINERY—VALUE OF ISSUES OF.	64,268	..
HULLS OF SHIPS, &c., BUILDING BY CONTRACT (Vote 8, Sec. 3, Sub-Head C.)	143,925	..
PURCHASE OF SHIPS, VESSELS, &c. (Vote 8, Sec. 3, Sub-Head D.)	..	..
REPAIRS AND ALTERATIONS OF SHIPS, &c., THEIR MACHINERY, AND STORES (Vote 8, Sec. 3, Sub-Head E.)	34,200	..
INSPECTION OF CONTRACT WORK (Vote 8, Sec. 3, Sub-Head F.)	..	10,000
GUN MOUNTINGS AND TORPEDO CARRIAGES AND GEAR	287,547*	..
YARD MACHINERY FOR HER MAJESTY'S SHORE ESTABLISHMENTS (Vote 8, Sec. 3. Sub-Head H.):		
Dockyards at Home	..	52,384
Naval Yards Abroad	..	11,345
Victualling Yards, &c.	..	271
ROYAL RESERVE OF MERCHANT CRUISERS (Vote 8, Sec. 3, Sub-Head I.)	..	42,200
TOTAL Section 3 carried to **RECAPITULATION** on p. 440. £	1,520,120	147,192

* Including £141,389 for payments to be made during the Year for Hydraulic Mountings, &c., for Specific Ships, and £146,158, value of transferable Gun Mountings, &c., to be issued from Store. The cost of altering, &c., transferable Gun Mountings, &c., is included under Sections 1 and 2.

ESTIMATED EXPENDITURE—*continued.*

SECTION III.—CONTRACT WORK.

ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.								Liabilities for future Years.
Naval Construction.				Stores for Ships, Coals for Steaming, &c.	Establishment and Incidental Charges Unapportioned to Ships, &c.		Total Amount of Estimated Expenditure.	
New Construction.	Re-construction, Repairs, Alterations, and Repairs.							
	Ships Re-constructing.	Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.		Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad).		
(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)	(l.)
£	£	£	£	£	£	£	£	£
7,240	532	311	431	..	19,661†	..	28,175	..
724	53	31	43	..	1,966†	..	2,817	..
869,624	111,464	9,092	..	..	..	..	990,180	843,538
28,069	710	8,239	27,250	..	..	..	64,268	..
143,925	..	..	..	..	..	..	143,925	8,280
..	..	..	..	..	..	..	..	..
..	..	..	34,200	..	..	..	34,200	..
8,246	892	289	573	..	..	..	10,000	..
211,593	23,425	26,638	25,891	..	..	..	287,547	298,593
For Apportionment, *see* Section II., p. 436				..	..	..	{ 52,384 11,345 }	..
..	..	..	..	..	271	..	271	..
..	..	..	..	..	42,200	..	42,200	107,176
1,269,421	**137,076**	**44,600**	**88,388**	..	**64,098**	..	**1,667,312**	**1,257,587**

† Due to Ships building by Contract under the Naval Defence and Imperial Defence Acts.

RECAPITULATION OF ESTIMATED EXPENDITURE.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE.		ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.								
			Naval Construction.					Establishment and Incidental Charges Unapportioned to Ships, &c.			
				Re-construction, Repairs, Alterations, and Refits.							
	Charged direct as incurred.	Establishment and Incidental Charges Apportioned.	New Construction.	Ships Re-constructing.	Ships for Reliefs, or Re-commission.	Ships in Commission and Reserve.	Stores for Ships, Coals for Steaming, &c.	Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad.)	Total Amount of Estimated Expenditure.	Liabilities for future Years.
	(a.)	(b.)	(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)	(l.)
SUB-HEADS OF EXPENDITURE.			A. and C.	D.			E.	F.			
	£	£	£	£	£	£	£	£	£	£	£
SECTION I.—DOCKYARD WORK PERSONNEL .	1,127,015	742,600	844,028	81,157	162,150	249,604	27,534	347,467 8,880*	148,795	1,869,615	..
SECTION II.—DOCKYARD WORK MATERIEL .	2,126,140	410,465	1,068,287	28,546	136,229	157,720	841,596	179,566 4,739*	183,651	2,536,605	..
SECTION III.—CONTRACT WORK . .	1,520,120	147,192	1,269,421	137,076	44,600	88,388	..	64,098	..	1,667,312	..
TOTAL ESTIMATED EXPENDITURE for 1890–91 . . . . £	4,773,275	1,300,257	3,181,736	246,779	342,979	495,712	869,130	604,750	332,446	6,073,532	
TOTALS OF SUB-HEADS £	6,073,532		3,181,736	1,085,470			869,130	937,195		6,073,532	
Add,—B. NEW CONSTRUCTION, provided for under Naval Defence Act, Section 1 (3)			3,595,930								
TOTAL NEW CONSTRUCTION (exclusive of Australasian Squadron, building under Imperial Defence Act). .			£6,777,666								

* Proportion of Establishment, &c., Charges incidental to Manufactures, which cannot be included in the Issuing Prices, *vide* Section 6 (1) of Naval Defence Act

NEW CONSTRUCTION.

EXPENDITURE TO 31ST MARCH, 1889.

ESTIMATED EXPENDITURE IN 1889–90.

UNEXPENDED BALANCES IN 1889–90 CARRIED FORWARD TO 1890–91,
UNDER NAVAL DEFENCE ACT,
ETC., ETC.

NEW CONSTRUCTION.—STATEMENT showing CUMULATIVE EXPENDITURE to
ESTIMATED BALANCES UNEXPENDED in 1889-90 carried forward to 1890-91
1890-91; ESTIMATED TOTAL CUMULATIVE EXPENDITURE to 31st March,

	Actual Expenditure to 31st March, 1889.				
	Charged Direct.				Proportion of Establishment, &c., Charges.
	Dockyard Work.		Contract Work.	Total.	
	Labour.	Materials.			
DOCKYARD BUILT SHIPS:	£	£	£	£	£
Old Programme (Naval Defence Act, Sect. 3 (1))	1,339,377	1,816,610	1,319,774	4,475,761	500,182
New Programme (Naval Defence Act, Sect. 1 (3))	7,344	15,836	760	23,940	4,003
CONTRACT BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1))	30,333	44,449	1,979,715	2,054,497	31,438
A.—TOTAL	..	..	..	..	..
Deduct,					
Balances in Cash, and Value of Stores unexpended in 1889-90, *and available in* 1890-91, *under Naval Defence Act, Sect* 3 (2) . .					
Balance to be provided for in 1890-91 . .					
CONTRACT BUILT SHIPS:					
B.—New Programme (Naval Defence Act, Sect. 1 (3))	..	..	..	..	..
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	..	..	..	..	..
C.—NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard Built	884	1,963	..	2,847	..
Contract Built	31	1,552	85,238	86,821	2,663
TOTAL	1,377,969	1,880,410	3,385,487	6,643,866	538,286
SHIPS OF AUSTRALASIAN SQUADRON BUILDING UNDER IMPERIAL DEFENCE ACT, 1888:					
Contract Built	..	..	190,708	190,708	..
GRAND TOTAL—NEW CONSTRUCTION .	1,377,969	1,880,410	3,576,195	6,834,574	538,286

31st March, 1889; Expenditure (as Estimated and Probable) in Year 1889–90; under the Naval Defence Act, Sect. 3 (2); Estimated Expenditure for 1891; and Estimated Liabilities for future Years.

Probable Expenditure and Estimated Balances Unexpended during the Year 1889-90. (Original Estimates for the Year in *Italics*.)

Charged Direct.				Proportion of Establishment, &c., Charges.	Estimated Balances Unexpended and available for Expenditure in 1890-91 under the Naval Defence Act, Sect. 3 (2).			
Dockyard Work.		Contract Work.	Total.		Dockyard Work.		Contract Work.	Total.
Labour.	Materials.				Labour.	Materials.		
£	£	£	£	£	£	£	£	£
359,997	230,228	237,089	827,314	99,500				
338,770	*236,820*	*327,359*	*902,949*	*96,966*				
291,199	734,520	183,829	1,209,548	116,659				
340,033	*463,820*	*478,648*	*1,282,501*	*115,594*	20,000	*Excess* *261,731**	370,459	128,728*
28,807	29,983	313,437	372,227	14,699				
21,200	*32,360*	*298,807*	*352,367*	*12,318*				
680,003	994,731*	734,355	2,409,089*					
700,003	*733,000*	*1,104,814*	*2,537,817*					
..	..	749,164	749,164	..				
..	..	*749,164*	*749,164*	..				
680,003	994,731	1,483,519	3,158,253					
700,003	*733,000*	*1,853,978*	*3,286,981*					
3,000	1,200	..	4,200	..				
2,600	*1,009*	..	*3,609*	..				
3,137	1,985	76,130	81,252	2,241				
7,650	*8,260*	*76,060*	*91,970*	*3,656*				
686,140	997,916	1,559,649	3,243,705	233,099				
710,253	*742,269*	*1,930,038*	*3,382,560*	*228,534*				
..	..	384,024	384,024	..				
..	..	*384,024*	*384,024*	..				
686,140	**997,916**	**1,943,673**	**3,627,729**	233,099				
710,253	*742,269*	*2,314,062*	*3,766,584*	*228,534*				

* These figures include armour plates to the value of £300,000, provided for under Section 3 (3) of the Naval Defence Act.

NEW CONSTRUCTION.—STATEMENT showing CUMULATIVE EXPENDITURE to 31st ESTIMATED BALANCES UNEXPENDED in 1889–90 carried forward to for 1890–91; ESTIMATED TOTAL CUMULATIVE EXPENDITURE to 31st March,

	Estimated Expenditure for the Year 1890–91.				
	Charged Direct.				Proportion of Establishment, &c. Charges.
	Dockyard Work.		Contract Work.	Total.	
	Labour.	Materials.			
	£	£	£	£	£
DOCKYARD BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1) .	89,290	49,040	182,824	321,154	23,825
New Programme (Naval Defence Act, Sect. 1 (3)	600,400	942,360	863,727	2,406,487	197,486
CONTRACT BUILT SHIPS:					
Old Programme (Naval Defence Act, Sect. 3 (1) .	8,200	8,600	146,370	163,170	4,043
TOTAL	697,890	1,000,000	1,192,921	2,890,811	225,354
Deduct,—					
Balance in Cash, and Value of Stores unexpended in 1889–90, *and available in* 1890–91 *under Naval Defence Act, Sect.* 3 (2) . .	. .	. .	. .	**128,728*	..
Balance to be provided for in 1890–91 . .	. .	. .	. .	*2,762,083*	
CONTRACT BUILT SHIPS:					
New Programme (Naval Defence Act, Sect. 1 (3))	..	..	3,595,930	3,595,930	..
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT . . .	697,890	1,000,000	4,788,851	6,486,741	..
C.—NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO AND STEAM BOATS, YARD CRAFT, &c.:					
Dockyard Built	260	460	...	720	..
Contract Built	1,740	1,540	60,290	63,570	1,281
TOTAL	699,890	1,002,000	4,849,141	6,551,031	226,635
SHIPS OF AUSTRALASIAN SQUADRON BUILDING UNDER IMPERIAL DEFENCE ACT, 1888:					
Contract Built	..	..	119,516	119,516	..
GRAND TOTAL—NEW CONSTRUCTION .	**699,890**	**1,002,000**	**4,968,657**	**6,670,547**	**226,635**

* These figures include armour plates to the value of £300,000, provided for under Section 3 (3) of the Naval Defence Act.

March, 1889; EXPENDITURE (as Estimated and Probable) in Year 1889–90; 1890–91 under the NAVAL DEFENCE ACT, Sect. 3 (2); ESTIMATED EXPENDITURE 1891; and ESTIMATED LIABILITIES for future Years.

Estimated Total Expenditure to 31st March, 1891.					Estimated Liabilities for Future Years (exclusive of Armament).				
Charged Direct.				Proportion of Establishment, &c. Charges.	Charged Direct.				Proportion of Establishment, &c. Charges.
Dockyard Work.		Contract Work.	Total.		Dockyard Work.		Contract Work.	Total.	
Labour.	Materials.				Labour.	Materials.			
£	£	£	£	£	£	£	£	£	£
1,788,664	2,095,878	1,739,687	5,624,229	623,507	23,670	22,580	..	46,250	5,897
898,943	1,692,716	1,048,316	3,639,975	318,148	Details not yet complete.				
67,340	83,032	2,439,522	2,589,894	50,180					
..	..	4,345,094	4,345,094	..	Details not yet complete.				
4,144	3,623	..	7,767	..	..	..	..	..	..
4,908	5,077	221,658	231,643	6,185	..	..	..	..	..
2,763,999	3,880,326	9,794,277	16,438,602	998,020	..	..	..	..	..
..	..	694,248	694,248	..	..	..	..	..	..
2,763,999	**3,880,326**	**10,488,525**	**17,132,850**	**998,020**					

GENERAL SUMMARY of the Estimated DIRECT and INDIRECT
REPAIRS, &c., and other

DESCRIPTION OF EXPENDITURE.	ESTIMATED			
	DOCKYARD WORK.			
	Labour Expended.		Net Value of Materials Issued.	
	Dockyards at Home.	Dockyards Abroad.	Dockyards at Home.	Dockyards Abroad.
	£	£	£	£
NEW CONSTRUCTION:				
Dockyard-Built Ships:				
OLD PROGRAMME.				
Armoured	23,100	..	14,500	..
Protected	63,790	..	33,740	..
Unprotected	2,400	..	800	..
Total . . .	89,290	..	49,040	..
NEW PROGRAMME.				
Armoured	230,600	..	629,620	..
Protected	303,300	...	277,240	..
Unprotected	66,500	..	35,500	..
Total . . .	600,400	..	942,360	..
Contract-Built Ships:				
OLD PROGRAMME.				
Armoured	4,300	..	5,300	..
Protected	3,900	..	3,300	..
Unprotected	..	..	..	..
Total . . .	8,200	..	8,600	..
NEW VESSELS NOT INCLUDED IN ABOVE, AND TORPEDO STEAM-BOATS, YARD CRAFT, &c.				
Dockyard-Built	..	260	..	460
Contract-Built. . . .	1,740	..	1,540	..
Total . . .	1,740	260	1,540	460
RE-CONSTRUCTION	70,000	..	23,000	..
REPAIRS, ALTERATIONS, AND RE-FITS TO SHIPS FOR RELIEFS OR RE-COMMISSION	112,092	27,360	103,300	22,400
REPAIRS TO SHIPS IN COMMISSION AND RESERVE . .	176,478	41,195	110,320	32,120
TOTAL RE-CONSTRUCTION, REPAIRS, &c., (excluding Establishment, &c., Charges)	358,570	68,555	236,620	54,520
TOTAL NEW CONSTRUCTION,* RE-CONSTRUCTION, REPAIRS, &c. (excluding Establishment, &c., Charges) . (Carried forward).	1,058,200	68,815	1,238,160	54,980

* Exclusive of estimated expenditure upon contract work under Section 1, (3) of the Naval Defence Act, and under the Imperial Defence Act.

EXPENDITURE upon NEW CONSTRUCTION, RE-CONSTRUCTION, SERVICES, for the Year 1890–91.

EXPENDITURE DURING 1890–91.

CONTRACT WORK, &c.							GRAND TOTAL, DOCKYARD AND CONTRACT WORK.
Propelling and other Machinery.	Hulls, &c., Building by Contract.	Purchase of Ships and Vessels.	Repairs, &c., by Contract.	Inspection of Contract Work.	Gun Mountings and Torpedo Gear.	TOTAL.	
£	£	£	£	£	£	£	£
7,038	..	..	..	..	12,560	19,598	..
83,494	..	..	..	..	34,749	118,243	..
25,787	..	..	..	..	19,196	44,983	..
116,319	..	..	..	..	66,505	182,824	321,154
215,000	..	..	..	..	87,500	302,500	..
441,670	..	..	..	..	31,589	473,259	..
66,288	8,440	..	..	..	13,240	87,968	..
722,958	8,440	..	..	..	132,329	863,727	2,406,487
..	..	..	..	..	8,069	8,069	..
34,616	96,995	..	..	..	4,690	136,301	..
2,000	..	..	..	..	..	2,000	..
36,616	96,995	..	..	..	12,759	146,370	163,170
..	..	..	..	..	..	..	..
21,800	38,490	..	..	..	..	60,290	
21,800	38,490	..	..	..	..	60,290	64,290
112,174	..	..	..	..	23,425	135,599	228,599
17,331	..	..	..	..	26,638	43,969	309,121
27,250	..	..	34,200	..	25,891	87,341	447,454
156,755	..	..	34,200	..	75,954	266,909	985,174
1,054,448	143,925	..	34,200	..	287,547	1,520,120	3,940,275

GENERAL SUMMARY of the Estimated DIRECT and INDIRECT
REPAIRS, &c., and other

DESCRIPTION OF EXPENDITURE.	ESTIMATED			
	DOCKYARD WORK.			
	Labour Expended.		Net Value of Materials Issued.	
	Dockyards at Home.	Dockyards Abroad.	Dockyards at Home.	Dockyards Abroad.
	£	£	£	£
TOTAL NEW CONSTRUCTION* (Brought forward) . .	**1,058,200**	**68,815**	**1,238,160**	**54,980**
SEA STORES FOR SHIPS . .	..	..	270,000	100,000
COALS FOR STEAMING . .	..	..	89,000	374,000
TOTAL SEA STORES, &c., &c.	..	..	**359,000**	**474,000**
TOTAL DIRECT EXPENDITURE	**1,058,200**	**68,815**	**1,597,160**	**528,980**
Manufactures	66,680	6,750	..	..
ESTABLISHMENT AND INCIDENTAL CHARGES, LABOUR, MATERIALS, &c.:				
Apportioned to Ships . .	79,497	..	25,297	..
Apportioned to Manufactures .	1,837	..	1,011	..
Unapportioned	118,845	63,941	46,155	18,477
TOTAL ESTABLISHMENT AND INCIDENTAL CHARGES, LABOUR, MATERIALS, &c. . . .	**200,179**	**63,941**	**72,463**	**18,477**
GRAND TOTAL—LABOUR, MATERIALS, AND CONTRACT WORK	(a) **1,325,059**	(a) **139,506**	**1,669,623**	**547,457**
Add,—				
ESTABLISHMENT AND INCIDENTAL CHARGES, OTHER THAN LABOUR, MATERIALS, &c.:				
Apportioned to Ships . .	..	..	..	..
Apportioned to Manufactures .	..	..	..	..
Unapportioned	..	..	..	..
Deduct,—				
Value of Labour expended upon Manufacture of Stores included in values of Materials issued . .	..	..	..	..
GRAND TOTAL OF ESTIMATED EXPENDITURE . . .	..	..	..	..

* Exclusive of estimated expenditure upon contract work under Section 1, (3) of the Naval Defence Act, and under the Imperial Defence Act.

EXPENDITURE upon NEW CONSTRUCTION, RE-CONSTRUCTION, SERVICES, for the Year 1890–91—*continued.*

EXPENDITURE DURING 1890–91.

CONTRACT WORK, &c.							GRAND TOTAL.
Propelling and other Machinery.	Hulls, &c., Building by Contract.	Purchase of Ships and Vessels.	Repairs, &c., by Contract.	Inspection of Contract Work.	Gun Mountings and Torpedo Gear.	Total.	
£	£	£	£	£	£	£	£
1,054,448	143,925	..	34,200	..	287,547	1,520,120	3,940,275
..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	833,000
1,054,448	143,925	..	34,200	..	287,547	1,520,120	4,773,275
..	..	..	..	..	..	..	73,430
..	..	..	..	10,000	..	10,000	..
..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..
..	..	..	..	10,000	..	10,000	365,060
1,054,448	143,925	..	34,200	10,000	287,547	1,530,120	5,211,765
.. ..							248,267
.. ..							10,771
.. ..							676,159
							6,146,962
.. ..							73,430
.. .. £							6,073,532

	Dockyards.	
	At Home.	Abroad.
	£	£
(*a*) Total Vote 8, Sect. 1, Sub-heads B and F.	1,285,374	138,266
Add,—		
Salaries of Inspectors of Shipwrights .	19,685	1,240
Balance unexpended in 1889–90, and available in 1890–91, under Naval Defence Act, Sect. 3, (2) . . .	20,000	..
Total . . .	£1,325,059	139,506

SUMMARY of SHIPS BUILDING, COMPLETING, and to be Commenced in

CLASS OF SHIP.	PORTSMOUTH.			DEVONPORT.			CHATHAM.			SHEERNESS.		
	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.
OLD PROGRAMME:												
ARMOURED:												
Battle Ships, 1st Class . .	1	..	..	..	..	..	1	..	..	..	..	..
Battle Ships, 2nd Class . .	..	..	..	..	..	..	..	..	..	..	..	..
Cruisers, 1st Class . . .	..	..	..	..	..	..	..	1	..	..	..	..
Total . . .	1	..	..	..	..	..	1	1	..	..	..	..
PROTECTED:												
Cruisers, 1st Class . . .	..	..	..	..	..	..	..	..	..	..	..	..
Cruisers, 2nd Class. . .	..	..	..	..	..	..	..	..	..	..	..	..
Cruisers, 3rd Class . . .	2	..	..	2	..	..	..	..	..	..	..	..
Torpedo Depôt Ships . .	1	..	..	..	..	..	..	..	..	..	..	..
Total . . .	3	..	..	2	..	..	..	..	..	..	..	..
UNPROTECTED;												
Torpedo Gun Boats, 1st Class .	..	..	..	..	..	..	4	..	..	..	..	..
Total . . .	..	..	..	..	..	..	4	..	..	..	..	..
Total Old Programme . .	4	..	..	2	..	..	5	1	..	..	..	..
NEW PROGRAMME (Naval Defence Act, 1889):												
ARMOURED:												
Battle Ships, 1st Class . .	..	1	..	..	..	..	..	1	..	..	..	..
Battle Ships, 2nd Class . .	..	1	..	..	..	..	..	..	1	..	..	..
Cruisers, 1st Class . . .	..	..	..	..	..	..	..	..	..	..	..	..
Total . . .	..	2	..	..	..	..	..	1	1	..	..	..
PROTECTED:												
Cruisers, 1st Class . . .	..	1	1	..	1	..	..	1	..	..	..	..
Cruisers, 2nd Class . .	1	..	..	..	2	3	..	2	..	..	..	1
Cruisers, 3rd Class . . .	..	..	..	..	..	..	..	..	..	..	..	..
Total . . .	1	1	1	..	3	3	..	3	..	..	..	1
UNPROTECTED:												
Torpedo Gun Boats, 1st Class .	..	..	..	1	..	..	..	..	..	4	1	1
Total . . .	..	..	..	1	..	..	..	..	..	4	1	1
Total New Programme (Naval Defence Act, 1889) . .	1	3	1	1	3	3	..	4	1	4	1	2
GRAND TOTAL, Ships Building and Completing . .	5	3	1	3	3	3	5	5	1	4	1	2

HER MAJESTY'S DOCKYARDS, and by CONTRACT during the YEAR 1890–91.

PEMBROKE.			TOTAL IN DOCKYARDS.			BY CONTRACT.			TOTAL IN DOCKYARD AND BY CONTRACT.			
To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	To Complete.	To Advance.	To Commence.	GRAND TOTAL.
..	..	..	2	..	..	..	..	..	2	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	..	1	..	..	2	..	2
..	..	..	2	1	..	..	1	..	2	2	..	4
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	4	..	..	..	..	..	4	..	..	4
..	..	..	1	..	..	..	..	..	1	..	..	1
..	..	..	5	..	..	..	..	..	5	..	..	5
..	..	..	4	..	..	..	..	..	4	..	..	4
..	..	..	4	..	..	..	..	..	4	..	..	4
..	..	..	11	1	..	..	1	..	11	2	..	13 **Total Old Programme.**
..	2	..	..	4	..	..	4	..	..	8	..	8
..	..	..	..	1	1	..	..	..	..	1	1	2
..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	..	..	5	1	..	4	..	..	9	1	10
..	..	..	..	3	1	..	5	..	..	8	1	9
..	1	1	1	5	5	..	17	..	1	22	5	28
..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	1	1	8	6	..	22	..	1	30	6	37
..	..	..	5	1	1	..	..	6	5	1	7	13
..	..	..	5	1	1	..	..	6	5	1	7	13
..	3	1	6	14	8	..	26	6	6	40	14	60 **Total New Programme (Naval Defence Act, 1889).**
..	3	1	17	15	8	..	27	6	17	42	14	*73 **GRAND TOTAL.**

* In addition to these there will be the New Dart Surveying Vessel, 2 Tank Vessels, 10 Coaling Lighters, and 3 Lighters completed by Contract during the year.

V.

LIST of NEW SHIPS and VESSELS Estimated to be passed into the FIRST RESERVE during the Years 1890–91 and 1889–90.

1890–91.

Name of Ship.		Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS:				
Nile . . .	Battle Ships, First Class.	11,940	12,000	10
Sans Pareil .	Battle Ships, First Class.	10,470	14,000	15
PROTECTED SHIPS:				
Vulcan . .	Torpedo Depôt Ship.	6,620	12,000	8
Pallas . .	Cruiser, Second Class.	2,575	7,500	8
Bellona . .	Cruisers, Third Class.	1,830	6,000	6
Barham . .	Cruisers, Third Class.	1,830	6,000	6
Blanche . .	Cruisers, Third Class.	1,580	3,000	6
Blonde . .	Cruisers, Third Class.	1,580	3,000	6
UNPROTECTED SHIPS:				
Antelope .	Torpedo Gun-boats, First Class.	735	..	2
Circe . . .	Torpedo Gun-boats, First Class.	735	..	2
Gleaner . .	Torpedo Gun-boats, First Class.	735	4,500	2
Gossamer .	Torpedo Gun-boats, First Class.	735	4,500	2
Hebe . . .	Torpedo Gun-boats, First Class.	735	..	2
Salamander .	Torpedo Gun-boats, First Class.	735	4,500	2
Seagull . .	Torpedo Gun-boats, First Class.	735	4,500	2
Sheldrake .	Torpedo Gun-boats, First Class.	735	4,500	2
Skipjack . .	Torpedo Gun-boats, First Class.	735	4,500	2

1889–90.

Name of Ship.		Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS:				
Trafalgar .	Battle Ships, First Class.	11,940	12,000	10
Victoria .	Battle Ships, First Class.	10,470	14,000	15
Camperdown	Battle Ships, First Class.	10,600	11,500	10
PROTECTED SHIPS:				
Magicienne	Cruisers, Second Class.	2,950	9,000	6
Marathon .	Cruisers, Second Class.	2,950	9,000	6
Melpomene	Cruisers, Second Class.	2,950	9,000	6
Barracouta	Cruisers, Third Class.	1,580	3,000	6
Barrosa .	Cruisers, Third Class.	1,580	3,000	6
UNPROTECTED SHIPS:				
Basilisk . .	Sloops.	1,170	2,000	8
Beagle . .	Sloops.	1,170	2,000	8
Goldfinch .	Gunboats, First Class.	805	1,200	6
Lapwing .	Gunboats, First Class.	805	1,200	6
Magpie . .	Gunboats, First Class.	805	1,200	6
Redbreast .	Gunboats, First Class.	805	1,200	6
Redpole .	Gunboats, First Class.	805	1,200	6
Ringdove .	Gunboats, First Class.	805	1,200	6
Widgeon .	Gunboats, First Class.	805	1,200	6
Sparrow .	Gunboats, First Class.	805	1,200	6
Thrush . .	Gunboats, First Class.	805	1,200	6
Sharpshooter	Torpedo Gun-boats, First Class.	735	4,500	2
Spanker .	Torpedo Gun-boats, First Class.	735	4,500	2
Speedwell .	Torpedo Gun-boats, First Class.	735	4,500	2
Mayflower .	Sailing Brig.	508	..	..

VI.

A List of the Armoured and Unarmoured Fighting Ships of England laid down to Build since April, 1880.

Rate.	Name.	When Laid Down.
	1880.	
Armour-plated Steel Barbette Ship	Collingwood.	12 July
Steam Cruiser .	Leander .	14 June
„ „	Phaeton .	14 June
„ „	Arethusa .	14 June
Composite Sloop .	Satellite * .	4 Oct.
„ „	Heroine * .	30 Aug.
„ „	Hyacinth * .	30 Aug.
Composite Gunboat	Starling .	19 Aug.
„ „	Stork . .	19 Aug.
„ „	Raven . .	19 Aug.
	1881.	
Armour-plated Steel Barbette Ship	Impérieuse .	10 Aug.
Armour-plated Steel Barbette Ship .	Warspite .	25 Oct.
Steam Cruiser .	Amphion .	25 April
Corvette (Steel and Iron) . . .	Calliope .	1 Oct.
Corvette (Steel and Iron) . . .	Calypso .	1 Sept.
Composite Sloop .	Rapid * .	21 April
„ „	Royalist * .	27 April
„ „	Caroline * .	24 Oct.
Composite Gunboat	Albacore .	2 Sept.
„ „	Mistletoe .	2 Sept.
„ „	Watchful .	2 Sept.
Composite Gun Vessel . .	Dolphin † .	10 Oct.
Composite Gun Vessel . .	Wanderer † .	10 Oct.
	1881—*continued*.	
Composite Steam Vessel . .	Alecto . .	16 Jan.
Composite Steam Vessel . .	Sphinx .	26 Aug.
	1882.	
Armour-plated Steel Barbette Ship .	Camperdown	18 Dec.
Armour-plated Steel Barbette Ship .	Benbow .	1 Nov.
Armour-plated Steel Barbette Ship .	Howe . .	7 June
Armour-plated Steel Barbette Ship .	Rodney .	6 Feb.
Composite Gun Vessel . .	Acorn . .	16 Oct.
	1883.	
Armour-plated Steel Barbette Ship .	Anson . .	24 April
Steam Cruiser (Steel)	Mersey .	9 July
Composite Sloop .	Pylades * .	1 Jan.
Composite Gun Vessel . .	Mariner .	8 Jan.
Composite Gun Vessel . .	Reindeer .	15 Jan.
Composite Gun Vessel . .	Racer . .	9 April
Composite Gun Vessel . .	Melita . .	18 July
	1884.	
Armour-plated Steel Turret Ship and Ram . . .	Hero . .	21 April
Steam Cruiser (Steel)	Severn .	1 Jan.
„ „	Thames .	14 April
„ „	Forth .	1 Dec.

* Re-classified as a corvette by A. O., 28 July, 1883.
† Re-classified as a sloop by A. O., 27 May, 1884.

A LIST OF THE ARMOURED AND UNARMOURED FIGHTING SHIPS OF ENGLAND LAID DOWN TO BUILD SINCE APRIL, 1880—*continued.*

Rate.	Name.	When Laid Down.
	1885.	
Torpedo Cruiser (Steel) .	Scout .	8 Jan.
Armed Despatch Vessel .	Alacrity * .	14 Feb.
Armed Despatch Vessel .	Surprise * .	14 Feb.
Armed Despatch Vessel .	Fearless .	22 Sept.
Composite Gun Vessel .	Icarus .	18 Aug.
Composite Gun Vessel .	Swallow .	1 Jan.
Gun and Torpedo Vessel (Steel) .	Curlew .	5 Jan.
Gun and Torpedo Vessel (Steel) .	Landrail .	5 Jan.
Armoured Turret Ship . .	Renown .	23 April
Armoured Turret Ship . .	Sans Pareil .	21 April
Torpedo Cruiser .	Archer .	2 March
„ „	Brisk . .	2 March
„ „	Cossack .	2 March
„ „	Mohawk .	2 March
„ „	Porpoise .	2 March
„ „	Serpent .	9 Nov.
„ „	Tartar . .	2 March
Armour - Belted Cruiser .	Australia .	21 April
Armour - Belted Cruiser .	Galatea .	21 April
Armour - Belted Cruiser .	Narcissus .	27 April
Armour - Belted Cruiser .	Orlando .	23 April
Armour - Belted Cruiser .	Undaunted .	23 April
Composite Gunboat	Bramble .	25 Aug.
	1885—*continued.*	
Composite Gunboat	Lizard. .	25 Aug.
„ „	Battler .	17 Aug.
„ „	Wasp . .	17 Aug.
Torpedo Gunboat .	Battlesnake .	— Nov.
	1886.	
Torpedo Cruiser .	Racoon .	1 Feb.
Armour-Belted Cruiser .	Immortalité .	18 Jan.
Armour-Belted Cruiser .	Aurora .	1 Feb.
Ironclad Turret .	Trafalgar .	18 Jan.
„ „	Nile . .	8 April
Torpedo Gunboat .	Sandfly .	19 April
„ „	Sharpshooter	— Sept.
„ „	Grasshopper.	27 April
„ „	Spider . .	7 June
Composite Sloop .	Buzzard .	1 May
	1887.	
Cruiser, 2nd class .	Medea .	April
„ „ .	Medusa .	April
„ „ .	Magicienne .	Aug.
„ „ .	Marathon .	Aug.
„ „ .	Melpomène .	Oct.
Sloop . . .	Daphne .	June
„ . . .	Nymphe .	July
Gunboat . .	Peacock .	May
„ . . .	Pigeon .	May
„ . . .	Plover . .	May
„ . . .	Pheasant .	June
„ . . .	Partridge .	June
„ . . .	Pigmy . .	Sept.
„ . . .	Magpie .	Dec.
Surveying Vessel .	Research .	Sept.

* Alacrity and Surprise were not intended to be fighting ships when first laid down, but armaments were ordered for them in January, 1886.

A LIST OF THE ARMOURED AND UNARMOURED FIGHTING SHIPS IN ENGLAND LAID DOWN TO BUILD SINCE APRIL, 1880—*continued.*

Rate.	Name.	When Laid Down.
	1888.	
Cruiser, 1st class, Protected .	Blake .	July
Cruiser, 1st class Protected .	Blenheim .	July
Protected Torpedo Depôt Ship .	Vulcan .	June
Cruiser, 3rd class Protected .	Barham .	Oct.
Cruiser, 3rd class Protected .	Barrosa .	May
Cruiser, 3rd class Protected .	Barracouta .	—
Cruiser, 3rd class Protected .	Blanche .	May
Cruiser, 3rd class Protected .	Blonde .	May
Cruiser, 3rd class Protected .	Bellona .	Aug.
Sloop, Unprotected	Beagle .	May
" "	Basilisk .	May
Torpedo Gunboat .	Salamander .	April
" " .	Seagull .	April
" " .	Sheldrake .	July
" " .	Skipjack .	July
" " .	Spanker .	April
" " .	Speedwell .	April
Gunboat, 1st class .	Sparrow .	—
" " .	Thrush .	—
" " .	Redbreast .	Jan.
" " .	Redpole .	Jan.
" " .	Lapwing .	May
" " .	Ringdove .	June
" " .	Goldfinch .	Aug.
" " .	Widgeon .	May
" " .	Plover .	—

Rate.	Name.	When Laid Down.
	1889.	
1st Class Armoured Battle Ship, Turret .	Hood .	Aug.
1st Class Armoured Battle Ship, Barbette .	Ramillies .	—
1st Class Armoured Battle Ship, Barbette .	Renown .	July
1st Class Armoured Battle Ship, Barbette .	Repulse .	March
1st Class Armoured Battle Ship, Barbette .	Resolution .	—
1st Class Armoured Battle Ship, Barbette .	Revenge .	—
1st Class Armoured Battle Ship, Barbette .	Royal Oak .	—
1st Class Armoured Battle Ship, Barbette .	Royal Sovereign .	—
2nd Class Armoured Battle Ship .	Barfleur .	—
2nd Class Armoured Battle Ship .	Centurion .	—
1st Class Protected Cruiser .	Centaur .	Aug.
1st Class Protected Cruiser .	Crescent .	—
1st Class Protected Cruiser .	Edgar .	June
1st Class Protected Cruiser .	Endymion .	—
1st Class Protected Cruiser .	Gibraltar .	—
1st Class Protected Cruiser .	Grafton .	—
1st Class Protected Cruiser .	Hawke .	June
1st Class Protected Cruiser .	St. George .	—

A LIST OF THE ARMOURED AND UNARMOURED FIGHTING SHIPS IN ENGLAND LAID DOWN TO BUILD SINCE APRIL, 1880—*continued.*

Rate.	Name.	When laid down.	Rate.	Name.	When laid down.
	1889—*continued.*			**1889**—*continued.*	
1st Class Protected Cruiser . .	Theseus .	—	2nd Class Protected Cruiser . .	Phœbe .	April
2nd Class Protected Cruiser . .	Andromache	April	2nd Class Protected Cruiser . .	Psyche .	—
2nd Class Protected Cruiser . .	Apollo. .	April	2nd Class Protected Cruiser . .	Pique . .	—
2nd Class Protected Cruiser . .	Æolus. .	—	2nd Class Protected Cruiser . .	Rainbow .	—
2nd Class Protected Cruiser . .	Astrea. .	—	2nd Class Protected Cruiser . .	Retribution .	—
2nd Class Protected Cruiser . .	Bonaventure	—	2nd Class Protected Cruiser . .	Sappho .	—
2nd Class Protected Cruiser . .	Brilliant .	—	2nd Class Protected Cruiser . .	Scylla. .	—
2nd Class Protected Cruiser . .	Cambrian .	—	2nd Class Protected Cruiser . .	Sirius. .	—
2nd Class Protected Cruiser . .	Indefatigable	—	2nd Class Protected Cruiser . .	Spartan .	—
2nd Class Protected Cruiser . .	Intrepid .	—	2nd Class Protected Cruiser . .	Sybille .	—
2nd Class Protected Cruiser . .	Iphigenia .	—	2nd Class Protected Cruiser . .	Terpsichore .	—
2nd Class Protected Cruiser . .	Latona .	—	2nd Class Protected Cruiser . .	Thetis. .	—
2nd Class Protected Cruiser . .	Melampus .	—	2nd Class Protected Cruiser . .	Tribune .	—
2nd Class Protected Cruiser . .	Naiad . .	—	1st Class Torpedo Gunboat . .	Alarm. .	—
2nd Class Protected Cruiser . .	Pallas. .	July	1st Class Torpedo Gunboat . .	Antelope .	—
2nd Class Protected Cruiser . .	Pandora .	—	1st Class Torpedo Gunboat . .	Circe . .	—
2nd Class Protected Cruiser . .	Pearl . .	April	1st Class Torpedo Gunboat . .	Gleaner .	Jan.
2nd Class Protected Cruiser . .	Pelorus .	—	1st Class Torpedo Gunboat . .	Gossamer .	Jan.
2nd Class Protected Cruiser . .	Persian .	—	1st Class Torpedo Gunboat . .	Hebe . .	—
2nd Class Protected Cruiser . .	Philomel .	May	1st Class Torpedo Gunboat . .	Leda . .	—
2nd Class Protected Cruiser . .	Phœnix .	—	1st Class Torpedo Gunboat . .	Jason . .	—

A LIST OF THE ARMOURED AND UNARMOURED FIGHTING SHIPS IN ENGLAND LAID DOWN TO BUILD SINCE APRIL, 1880—*continued.*

Rate.	Name.	When laid down.	Rate.	Name.	When laid down.
1889—*continued.*			**1889**—*continued.*		
1st Class Torpedo Gunboat . .	Jasseur .	—	1st Class Torpedo Gunboat . .	Speedy .	—
1st Class Torpedo Gunboat . .	Niger . .	—	1st Class Torpedo Gunboat . .	Whiting .	—
1st Class Torpedo Gunboat . .	Onyx . .	—	1st Class Torpedo Gunboat . .	Wizard .	—
1st Class Torpedo Gunboat . .	Renard .	—			

VII.—STATEMENT showing the COST of the different CLASSES of
in each Year to the FLEET, and the

YEAR OF COMPLETION.	Armoured, Protected, and Partially Protected. Depreciation, 4 per cent. per annum for 22 years from date of Completion.	Corvettes, Sloops, Torpedo Cruisers, Gun Vessels, Gunboats, Troop Ships, &c. Depreciation, 6 per cent. per annum for 15 years from date of Completion.
	£	£
First Cost of Ships not included for Depreciation in the Table	4,242,335	4,557,653
First Cost of Ships completed in 1868-69 . .	1,739,239	..
" " 1869-70 . .	478,971	..
" " 1870-71 . .	782,386	..
" " 1871-72 . .	939,092	..
" " 1872-73 . .	273,169	..
" " 1873-74 . .	847,405	..
" " 1874-75 . .	300,767	..
" " 1875-76 . .	..	519,401
" " 1876-77 . .	802,030	411,785
" " 1877-78 . .	1,699,854	1,022,475
" " 1878-79 . .	1,134,012	1,286,036
" " 1879-80 . .	809,139	674,575
" " 1880-81 . .	684,102	363,215
" " 1881-82 . .	2,370,225	284,220
" " 1882-83 . .	755,247	175,555
" " 1883-84 . .	251,322	461,852
" " 1884-85 . .	725,919	374,122
" " 1885-86 . .	2,884,409	..
" " 1886-87 . .	2,747,065	624,549
" " 1887-88 . .	6,212,081	1,316,159
" " 1888-89 . .	1,889,544	626,751
" " 1889-90 (*a*) .	2,335,017	869,483
TOTAL	30,660,995	9,010,178
Add,—Cost of Vessels lost, sold, or broken up, built within above period	952,649	563,781
Add,—Estimated Cost of Sans Pareil included in Lord Northbrook's Programme, not completed on 1st April, 1890 . . .	774,363	..
TOTAL	32,388,007	9,573,959
Estimated Annual Percentage for Depreciation	4 per cent.	6 per cent.
Annual Amount required for Replacement . .	£1,295,520	£574,437

(*a*) Revised estimated cost.

VESSELS (including Proportion of INCIDENTAL CHARGES) added
Estimated Annual RATE of DEPRECIATION.

Torpedo Boats, Steam Launches, &c. Depreciation, 9 per cent. per annum for 11 years from date of Completion.	Guard, Receiving, Training, and Harbour Vessels. Depreciation, 4 per cent. per annum for 22 years from date of Completion.	Small Vessels, Tugs, and Yard Craft. Depreciation, 5 per cent. per annum for 18 years from date of Completion.	TOTAL.
£	£	£	£
170,000 (Estimated.)	4,686,300	314,555	13,970,843
..	23,753	..	1,762,992
..	..	..	478,971
..	97,844	..	880,230
..	33,371	..	972,463
..	22,722	..	295,891
..	..	40,547	887,952
..	..	8,338	309,105
..	..	60,862	580,263
..	..	..	1,213,815
..	..	26,567	2,748,896
	..	..	2,420,048
1,640,000 (Estimated.)	54,036	..	29,310,318
	..	4,368	
	..	9,830	
	..	23,920	
	..	71,512	
	..	..	
	..	7,280	
	..	12,869	
	..	9,204	
	..	21,129	
..	21,619	..	
1,640,000	253,345	296,426	41,860,944
27,000 (Estimated.)	..	63,106	1,606,536
..	..	..	774,363
1,667,000	253,345	359,532	44,241,843
9 per cent.	4 per cent.	5 per cent.	..
£150,030	£10,134	£17,977	£2,048,098

VIII.—STATEMENT showing the COST of CONSTRUCTION, REPAIRS
apportioned to SHIPS during the

YEAR.	EXPENDITURE FOR LABOUR AND — CONSTRUCTION. — Dockyard-built Vessels. — Armoured.	Dockyard-built Vessels. — Unarmoured.	Contract-built Vessels. — Armoured.	Contract-built Vessels. — Unarmoured.	TOTAL.
1869–70 . .	536,293	259,906	540,055	50,793	1,387,047
1870–71 . .	558,800	264,052	455,415	52,547	1,330,814
1871–72 . .	345,750	448,074	349,288	41,060	1,184,172
1872–73 . .	237,956	413,878	61,869	95,384	809,087
1873–74 . .	377,715	615,128	8,244	288,941	1,290,028
1874–75 . .	710,236	372,023	31,928	413,974	1,528,161
1875–76 . .	759,495	289,606	298,968	265,149	1,613,218
1876–77 . .	604,607	497,506	335,711	684,136	2,121,960
1877–78 . .	408,433	421,897	1,540,039	552,073	2,922,442
1878–79 . .	372,679	353,504	258,516	523,350	1,508,049
1879–80 . .	528,471	363,932	103,253	392,951	1,388,607
1880–81 . .	648,017	309,475	50,781	418,076	1,426,349
1881–82 . .	938,641	342,232	10,672	390,955	1,682,500
1882–83 . .	961,151	381,010	29,559	395,294	1,767,014
1883–84 . .	1,127,377	436,507	132,760	233,446	1,930,090
1884–85 . .	1,283,899	427,578	233,828	296,765	2,242,070
1885–86 . .	990,833	613,785	887,281	1,245,562	3,737,461
1886–87 . .	1,163,742	384,968	1,240,938	705,577	3,495,225
1887–88 . .	1,052,610	679,282	755,245	332,400	2,819,537
1888–89 . .	455,633	1,337,173	264,277	532,430*	2,589,513

* Of this sum £190,708 is expenditure under the Imperial Defence Act of 1888.

and MAINTENANCE, and INCIDENTAL CHARGES of the DOCKYARDS
Years 1869–70 to 1888–89.

MATERIALS ON			TOTAL EXPENDITURE ON SHIPS.			TOTAL AMOUNT EXPENDED UNDER VOTE.	
REPAIR AND MAINTENANCE.							
Armoured.	Unarmoured.	TOTAL.	Direct — For Labour and Materials, including Payments to Contractors, &c.	Indirect — For Dockyard Incidental Charges.	TOTAL.	Votes 6 and 10, for Labour and Stores, &c.	Navy Votes.
180,743	446,549	577,292	1,964,339	491,104†	2,455,443	2,572,745	10,102,641
182,065	487,551	669,616	2,000,430	499,902†	2,500,332	2,635,076	10,087,414
87,595	397,342	484,937	1,669,109	436,102	2,105,211	2,545,865	9,875,981
158,933	386,983	545,916	1,355,003	416,888	1,771,891	2,413,347	9,564,678
291,381	524,601	815,982	2,106,010	483,398	2,589,408	3,175,631	10,558,751
320,229	672,570	992,799	2,520,960	490,419	3,011,379	3,455,650	10,776,277
321,871	631,806	953,677	2,566,895	530,179	3,097,074	3,540,092	10,903,924
207,446	600,210	807,656	2,929,616	509,973	3,439,589	3,929,846	11,259,835
489,182	580,243	1,069,425	3,991,867	521,034	4,512,901	5,123,591	12,800,044
430,077	634,074	1,064,151	2,572,200	566,516	3,138,716	3,810,737	11,959,139
331,033	491,187	822,220	2,210,827	529,493	2,740,320	3,106,563	11,004,394
259,987	581,723	841,710	2,268,059	522,933	2,790,992	3,082,803	10,513,469
212,288	478,792	691,080	2,373,580	513,773	2,887,353	3,318,555	10,870,922
321,979	555,718	877,697	2,644,711	524,948	3,169,659	3,472,953	12,063,210
266,497	659,682	926,179	2,856,269	549,442	3,405,711	3,615,264	10,758,594
328,270	686,543	1,014,813	3,256,883	572,402	3,829,285	3,861,333	11,625,809
335,222	651,671	1,691,019‡	5,428,480	593,891	6,022,371	7,188,536	16,193,701
305,865	608,258	914,123	4,409,348	548,845	4,958,193	5,505,568	13,118,657
292,399	536,011	828,410§	3,647,947	515,728	4,163,675	4,736,941	12,348,895
300,925	473,146‖	774,071	3,363,584*	416,578¶	3,780,162*	3,980,482	12,934,641

† These amounts are based upon the average indirect expenses for 1871–72 and 1872–73.
‡ Includes £704,126 for hire and fitting out of armed cruisers, &c.
§ Includes £22,264 }
‖ Includes £18,347 } for hire, &c., of the Royal Reserve of Merchant Cruisers.
¶ Includes £27,104 }

IX.

Comparative Tables of British, French, and Russian Ships, as given in the 'Naval Annual' for 1888-89, brought up to date as far as information to hand admits.

TABLE I.—BATTLE SHIPS

Launched 1878 *to* 1889.

ENGLAND.				FRANCE.				RUSSIA.			
Date.	Name.	Displacement.	Speed.	Date.	Name.	Displacement.	Speed.	Date.	Name.	Displacement.	Speed.
		Tons.	Knots.			Tons.	Knots.			Tons.	Knots.
1888	Nile	11,940	16·5	1887	Neptune	10,581	15·0	1889	Nicholas I.	8,000	16·0
1887	Trafalgar	11,940	16·5	1887	Marceau	10,581	15·0	1887	Alexander II. ..	8,440	15·0
1887	Victoria	10,470	16·7	1886	Hoche	10,581	15·0	1887	Tchesmé	10,800	15·0
1887	Sanspareil	10,470	16·7	1885	Formidable ..	11,380	15·0	1887	Sinope	10,800	15·0
1886	Anson	10,600	16·7	1885	Caïman	7,200	14·5	1886	Ekaterina II. ..	10,800	15·0
1885	Camperdown ..	10,600	16·7	1885	Requin	7,200	14·5				
1885	Howe	10,300	16·7	1883	Amiral Baudin	11,380	15·0				
1885	Hero	6,200	15·5	1883	Indomptable ..	7,200	14·5				
1885	Benbow	10,600	16·7	1881	Terrible	7,200	14·5				
1884	Rodney	10,300	16·7	1881	Courbet	9,700	15·0				
1882	Collingwood ..	9,500	16·4	1879	Dévastation ..	10,100	15·1				
1882	Colossus	9,420	15·4	1879	Amiral Duperré	11,100	14·2				
1882	Edinburgh	9,420	15·4	1890	Magenta	10,581	15·0				
1881	Conqueror	6,200	15·5								
1880	Ajax	8,660	13·0								
1879	Agamemnon ..	8,660	13·0								
	Total 16 Ships	155,280			Total 13 Ships	124,784			Total 5 Ships	48,840	

TABLE II.—BATTLE SHIPS

Launched before 1878, and reckoned effective.

ENGLAND.				FRANCE.				RUSSIA.			
Date of Launch.	Name.	Displacement.	Speed.	Date of Launch.	Name.	Displacement.	Speed.	Date of Launch.	Name.	Displacement.	Speed.
		Tons.	Knots.			Tons.	Knots.			Tons.	Knots.
1876	Inflexible	11,880	13·8	1877	Triomphante ..	4,700	12·9	1872	Peter the Great ..	9,340	14·0
1876	Téméraire	8,540	14·6	1876	Redoutable	9,200	14·6	1867	Kniaz Pojarsky ..	4,500	10·5
1875	Dreadnought ..	10,820	14·2	1876	Trident	8,800	14·1				
1875	Superb	9,170	13·2	1875	Colbert	8,400	14·4				
1875	Alexandra	9,490	15·0	1875	Victorieuse	4,600	12·7				
1874	Neptune	9,310	14·2	1873	Friedland	8,300	13·3				
1872	Thunderer	9,330	13·4	1873	Richelieu	9,100	13·1				
1871	Devastation ..	9,330	13·8	1872	La Galissonnière	4,700	13·1				
1870	Sultan	9,290	13·5	1870	Suffren	7,600	14·3				
1870	Swiftsure	6,910	13·7	1869	Marengo	7,900	13·5				
1870	Triumph	6,640	13·5	1868	Océan	7,500	13·7				
1870	Iron Duke	6,010	12·5	1863	Héroine	5,887	13·0				
1869	Audacious	6,010	13·2								
1869	Invincible	6,010	13·8								
1868	Monarch	8,320	14·9								
1868	Hercules	8,680	13·6								
1865	Bellerophon ..	7,550	14·2								
	Total 17 Ships	143,210			Total 12 Ships	86,687			Total 2 Ships	13,840	

N.B.—The hulls of all the Battle Ships launched for the British Navy in the period 1868–77 are of iron. With the exception of the Redoubtable, Héroine, and Friedland, all the French ships are of wood.

TABLE III.—BATTLE SHIPS

Not Effective unless Repaired. *Sans Valeur Sérieuse.*

ENGLAND.					FRANCE.				
Date of Launch.	Material of Hull.	Name.	Speed.	Displacement.	Date of Launch.	Material of Hull.	Name.	Speed.	Displacement.
			Knots.	Tons.				Knots.	Tons.
1863	Iron	Valiant	..	6,710	1872	Wood	Bouledogue	12·2	3.505
					1871	Wood	Tigre	12·1	3,500
1862	Iron	Hector	12·4	6,710	1870	Wood	Bélier	12·3	3,600
					1868	Wood	Montcalm	11·7	3,840
1861	Iron	Defence	..	6,270	1867	Wood	Thétis	12·0	3,621
					1865	Wood	Taureau	12·5	2,700
					1865	Wood	Revanche	13·2	5,819
					1864	Wood	Savoie	13·4	5,819
					1863	Iron	Onondaga	7·0	2,590
		Total 3 Ships	..	19,690			Total 9 Ships	..	34,989

TABLE IV.—COAST DEFENCE.

Ships Completed and Completing after Launching.

ENGLAND.			FRANCE.			RUSSIA.		
Date of Launch.	Name.	Displacement.	Date of Launch.	Name.	Displacement.	Date of Launch.	Name.	Displacement.
		Tons.			Tons.			Tons.
1879	Orion	4,870	Building	Phlégéton	1,640	1868	Admiral Spiridoff ..	3,740
1876	Belleisle	4,870	„	Styx	1,640	1868	Admiral Greig ..	3,593
1872	Rupert	5,440	1888	Grenade	1,050	1868	Admiral Chichagoff	3,511
1871	Cyclops	3,480	1887	Cocyte	1,639	1867	Admiral Lazareff ..	3,536
1871	Hecate	3,480	1886	Mitraille	1,045	1865	Kreml	3,412
1871	Hydra	3,480	1885	Achéron	1,639	1864	Netron Menya ..	3,370
1871	Gorgon	3,480	1885	Flamme	1,045	1863	Pervenets	3,279
1870	Hotspur	4,010	1884	Fusée	1,045			
			1883	Furieux	5,700			
			1880	Tonnant	4,707			
			1878	Vengeur	4,523			
			1877	Fulminant	5,600			
			1876	Tempête	4,523			
			1875	Tonnerre	5,700			
	Total 8 Ships ..	33,110		Total 14 Ships ..	41,496		Total 7 Ships ..	24,441

SUMMARY.—France and Russia, 21 ships, 65,937 tons displacement. England, 8 ships, 33,110 tons displacement.

TABLE V.—HARBOUR DEFENCE.

Ships Completed.

ENGLAND.				RUSSIA.			
Date of Launch.	Name.	Speed.	Displacement.	Date of Launch.	Name.	Speed.	Displacement.
		Knots.	Tons.			Knots.	Tons.
1871	Glatton	12·1	4,910	1875	Admiral Popoff	7·0	3,550
1870	Magdala	10·4	3,340	1873	Novgorod	7·0	2,500
1870	Abyssinia	9·6	2,900	1867	Charodeika	8·5	2,026
1870	Cerberus	9·75	3,480	1867	Rusalka	8·5	1,960
1867	Penelope	12·7	4,470	1864	Vestchun	7·0	1,565
1865	Viper	9·6	1,230	1864	Uragan	7·0	1,565
1865	Vixen	8·9	1,230	1864	Tifun	7·0	1,565
1864	Prince Albert	11·3	3,880	1864	Strelets	7·0	1,565
1863	Scorpion	10·5	2,750	1864	Perun	7·0	1,565
1863	Wivern	10·1	2,750	1864	Lava	7·0	1,565
				1864	Latnik	7·0	1,565
				1864	Koldun	7·0	1,565
				1864	Edinorog	7·0	1,565
				1864	Bronenosets	7·0	1,565
				1864	Smertch	8·2	1,530
	Total 10 Ships	.. ..	30,940		Total 15 Ships	.. ..	27,216

TABLE VI.—CRUISERS—ARMOURED.

ENGLAND.				FRANCE.				RUSSIA.			
Date of Launch.	Name.	Displacement.	Speed.	Date of Launch.	Name.	Displacement.	Speed.	Date of Launch.	Name.	Displacement.	Speed.
		Tons.	Knots.			Tons.	Knots.			Tons.	Knots.
1887	Galatea	5,600	18·5	1883	Duguesclin	5,900	14·0	1884	Admiral Nakhimoff ..	7,780	16·0
1887	Aurora	5,600	18·5	1882	Vauban	5,900	14·0	1883	Vladimir Monomakh	5,796	15·4
1887	Immortalité ..	5,600	18·5	1880	Bayard	6,000	14·5	1883	Dimitri Donskai ..	5,796	16·2
1886	Orlando	5,600	18·5	1879	Turenne	6,400	14·1	1878	Minin	5,740	12·9
1886	Australia ..	5,600	18·5					1875	Duke of Edinburgh ..	4,600	13·0
1886	Narcissus ..	5,600	18·5	Building	Dupuy de Lôme ..	6,300	20·0	1873	General Admiral ..	4,600	13·0
1886	Undaunted ..	5,600	18·5	"	N.	6,300	20·0	1888	Pamyat Azova	6,000	17·5
1884	Warspite.. ..	8,400	16·7	"	Bruix	4,745	19·0				
1884	Impérieuse ..	8,400	16·7	"	Chanzy	4,745	19·0				
1876	Nelson	7,630	14·0	"	Charner	4,745	19·0				
1876	Northampton ..	7,630	13·2	"	Latouche Tréville ..	4,745	19·0				
1875	Shannon	5,390	12·3								
1866	Northumberland	10,780	14·1								
1865	Agincourt ..	10,690	14·8								
1863	Minotaur ..	10,690	14·4								
1863	Achilles	9,820	14·3								
1861	Black Prince ..	9,210	13·6								
1860	Warrior	9,210	14·1								
	Total 18 Ships	137,050			Total 10 Ships ..	55,780			Total 7 Ships ..	40,312	

N.B.—The material of the hull of all the ships, except of two French ships, is iron or steel. These two ships—the Turenne and Bayard—are wood-built.

TABLE VII.—ARMOUR CLADS.

On the Stocks.

	ENGLAND.			FRANCE.			RUSSIA.		
	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.
		Tons.	Knots.		Tons.	Knots.		Tons.	Knots.
1st class Battle ships	Hood	14,150	17·5	Brennus	11,000	..	Gheorgy Pobyedonosets	10,280	16·0
	Ramillies	14,150	17·5				Rurik	10,000	..
	Resolution	14,150	17·5				Dvenadsat Apostoloff ..	10,000	..
	Revenge	14,150	17·5						
	Royal Oak	14,150	17·5						
	Royal Sovereign	14,150	17·5						
	Renown	14,150	17·5						
	Repulse	14,150	17·5						
2nd class ships	Barfleur	9,000	17·5	Bouvines	6,800	..	Gangoot	6,592	..
	Centurion	9,000	17·5	Jemappes	6,800	..			
				Valmy	6,800	..			
				Tréhouart	6,800	..			
Armoured Gunboats	Nil	.. ..	.. ..	Phlégéton	1,640	13·0	Grozyashtchy	1,492	15·0
				Styx	1,640	13·0	Not named	1,492	15·0

TABLE VIII.—CRUISERS—UNARMOURED.

Completed and Completing.

N.B.—All the cruisers of 16 knots and over are built of steel or iron, and some are sheathed with wood, and coppered. For the inferior speeds the material of hull is given in a separate column. S = steel; C = composite; W = wood.)

	ENGLAND.				FRANCE.				RUSSIA.			
	Date.	Name.	Displacement.	Speed.	Date.	Name.	Displacement.	Speed.	Date.	Name.	Displacement.	Speed.
			Tons.	Knots.			Tons.	Knots.			Tons.	Knots.
20 knots and over.	1889	Blake	9,000	22		Davout	3,027	20·0				
	1888	Medusa	2,800	20								
	1888	Medea	2,800	20								
	1889	Vulcan	6,620	20								
		4 Ships	21,220									
19-20 knots.	1889	Barham	1,830	$19\frac{1}{2}$	1889	Alger	4,160	19 0	1887	Admiral Korniloff	5,029	18
	1888	Marathon ..	2,950	$19\frac{3}{4}$	1889	Jean Bart ..	4,160	19·0				
	1888	Magicienne ..	2,950	$19\frac{3}{4}$	1889	Surcouf	1,850	19·5				
	1888	Melpomene ..	2,950	$19\frac{3}{4}$	1888	Cecille	5,766	19·0				
		*Pandora	2,575	19·0	1888	Troude	1,847	19·5				
		*Pelorus	2,575	19·0	1888	Lalande	1,847	19·5				
		*Persian	2,575	19·0	1888	Cosmao	1,847	19·5				
		*Phœnix	2,575	19·0	1888	Coetlagon ..	1,818	19·5				
		*Psyche	2,575	19·0	1888	Forbin	1,850	19·5				
					1886	Tage	7,045	19·0				
		9 Ships	23,555			10 Ships ..	22,020			1 Ship	5,029	
18–19 knots.	1878	Mercury	3,730	18·0	1884	Milan	1,540	18·0				
	1877	Iris	3,730	18·0								
		2 Ships	7,460									
17–18 knots.	1887	Serpent	1,770	17·5 to 18·0	1887	Faucon	1,280	17·0 to 18·0				
	1887	Racoon	1,770	17·5 to 18·0	1886	Epervier	1,280	17·0 to 18·0				
	1886	Brisk	1,770	17·0	1885	Condor	1,280	17·0 to 18·0				
	1886	Mohawk	1,770	17·0	1889	Vautour	1,280	17·0 to 18·0				
	1886	Porpoise	1,770	17·0								

* Australian Squadron.

CRUISERS—UNARMOURED—(*continued*).

Completed and Completing.

	ENGLAND.					FRANCE.					RUSSIA.			
	Date.	Name.	Displacement.	Speed.		Date.	Name.	Displacement.	Speed.		Date.	Name.	Displacement.	Speed.
			Tons.	Knots.				Tons.	Knots.				Tons.	Knots.
17–18 knots—*contd.*	1886	Cossack	1,770	17·0										
	1886	Tartar	1,770	17·0										
	1886	Fearless	1,580	17·0										
	1886	Forth	4,050	17·0										
	1885	Thames	4,050	17·0										
	1885	Mersey	4,050	17·0										
	1885	Severn	4,050	17·0										
	1885	Alacrity	1,700	17·0										
	1885	Scout	1,580	17·0										
	1885	Archer	1,770	17·0										
		15 Ships ..	35,220				4 Ships ..	5,120						
				Speed.	Material of Hull.				Speed.	Material of Hull.				
16–17 knots.	1889	Blanche	1,580	16·5	S	1884	Sfax	4,488	16·0	S				
	1889	Blonde	1,580	16·5	S	1876	Duquesne ..	5,800	16·9	C				
	1889	Barrosa	1,580	16·5	S	1876	Tourville ..	5,600	16·9	C				
	1889	Barracouta ..	1,580	16·5	S									
	1885	Surprise	1,650	16·8	S									
	1883	Phæton	4,300	16·5	S									
	1883	Amphion ..	4,300	16·5	S									
	1882	Leander	4,300	16·5	S									
	1882	Arethusa	4,300	16·5	S									
	1873	Shah	6,250	16·2	C									
	1868	Inconstant ..	5,780	16·2	C									
		11 Ships ..	37,200				3 Ships	15,888						

15–16 knots.	1876	Bacchante	4,130	15·1	C	1887	Duguay Trouin	3,300	15·9	C	1885	Rynda	2,950	15·0
	1873	Raleigh	5,200	15·3	C	1880	Nielly	2,300	15·0	C	1884	Vitiaz	2,950	15·0
	1869	Volage	3,080	15·1	C	1879	D'Estaing ..	2,400	15·3	C				
	1869	Active	3,080	15·1	C	1874	Dupetit Thouars	2,000	15·0	W				
						1874	Seignelay ..	1,900	15·0	W				
						1869	Hirondelle ..	1,869	15·5	W				
		4 Ships	15,490				6 Ships	13,766				2 Ships	5,900	
14–15 knots.	1889	Basilisk	1,170	14·5	C	1884	Dubourdieu ..	3,400	14·0	W	1880	Pamyat Merkuriya	3,050	14·0
	1889	Beagle	1,170	14·5	C	1882	Aréthuse	3,400	15·0	W				
	1888	Daphne	1,140	15·0	S	1882	Roland	2,300	14·0	C	1878	Zabiyaka ..	1,234	14·0
	1888	Nymphe	1,140	15·0	S	1882	Primauguet ..	2,400	15·0	C				
	1887	*Buzzard	1,140	15·0	S	1881	Iphigenie ..	3,200	14·0	W				
	1877	Euryalus ..	4,140	14·7	C	1881	Magon	2,300	14·0	C				
	1875	Boadicea	4,140	14·7	C	1881	Naïde	3,500	14·0	C				
	1874	Rover	3,460	14·5	C	1879	Forfait	2,400	14·0	C				
						1879	Villars	2,400	14·0	C				
						1877	Laperouse ..	2,400	14·0	C				
						1876	Rigault-de-Genouilly	1,710	14·3	C				
						1872	Champlain ..	2,000	14·0	W				
						1870	Sané	1,900	15·0	W				
						1868	Châteaurenault	1,850	14·2	W				
						1868	Eclaireur ..	1,830	15·0	W				
						1866	Desaix	1,683	14·2	W				
		8 Ships	17,500				16 Ships ..	38,673				2 Ships	4,284	
				Cost. £										
13–14 knots.	1884	Calypso	2,770	165,552		1872	La Clocheterie	2,100	13·7					
	1884	Pylades	1,420	82,071		1872	Duchaffault ..	1,340	12·7					
	1883	Calliope	2,770	157,930		1872	Kerguelen ..	1,340	12·7					
	1883	Rapid	1,420	73,644		1869	Infernet	1,936	13·9					
	1883	Royalist	1,420	78,357										
	1882	Caroline	1,420	81,002										

* Buzzard class has been added to the list of cruisers.

CRUISERS—UNARMOURED—(*continued*).

Completed and Completing.

	ENGLAND.				FRANCE.				RUSSIA.			
	Date.	Name.	Displacement.	Cost.	Date.	Name.	Displacement.	Speed.	Date.	Name.	Displacement.	Speed.
			Tons.	£			Tons.	Knots.			Tons.	Knots.
13–14 knots—*continued.*	1881	Cordelia	2,380	130,875								
	1881	Canada	2,380	131,565								
	1881	Satellite	1,420	68,056								
	1881	Heroine	1,420	73,297								
	1881	Hyacinth ..	1,420	73,210								
	1880	Constance ..	2,380	123,015								
	1878	Cleopatra ..	2,380	122,681								
	1878	Curaçoa	2,380	121,596								
	1878	Conquest.. ..	2,380	123,044								
	1878	Champion ..	2,380	122,903								
	1877	Garnet	2,120	102,288								
	1876	Emerald	2,120	107,424								
	1875	Opal	2,120	102,824								
	1874	Sapphire	1,970	86,899								
		20 Ships ..	40,470	2,128,233		4 Ships.. ..	6,716					
12–13 knots.	1878	Comus	2,380	123,913	1874	Fabert	2,100		1881	Opritchnik ..	1,335	
	1878	Carysfort.. ..	2,380	123,678	1872	Beautemps-Beaupré	1,350		1880	Vestnik	1,335	
									1880	Strélok	1,335	
	1876	Turquoise ..	2,120	105,244					1879	Plastun	1,335	
	1876	Ruby	2,120	102,024					1877	Razboynik ..	1,335	
	1875	Tourmaline ..	2,120	103,429					1878	Nayézdnik ..	1,335	
									1879	Africa	2,852	
									1876	Djigit	1,335	
									1875	Kreiser	1,335	
									1874	Asia..	2,483	
		5 Ships.. ..	**11,120**	**558,288**		2 Ships.. ..	**3,450**			10 Ships ..	**16,015**	

Table IX.—Torpedo Vessels.

Completed and completing.

England				France and Russia				
Date of Launch.	Name.	Speed.	Displacement.	Date of Launch.	Name.	Flag.	Speed.	Displacement.
		Knots.	Tons.				Knots.	Tons.
1890	Gleaner	21·0	735	Building	Kapitan Saken	R	20·0	600
1890	Gossamer	21·0	735	1886	Ilyin	R	20·0	600
1889	Spanker	21·0	735	1886	Lance	F	19·5	320
1889	Speedwell	21·0	735	1886	Salve	F	19·5	320
1889	*Whiting	21·0	735	1885	Bombe	F	19·5	320
1889	*Wizard	21·0	735	1885	Couleuvrine	F	19·5	320
1888	Sharpshooter	21·0	735	1885	Dague	F	19·5	320
1889	Salamander	21·0	735	1885	Dragonne	F	19·5	320
1889	Seagull	21·0	735	1885	Flèche	F	19·5	320
1889	Sheldrake	21·0	735	1885	Sainte-Barbe	F	19·5	320
1889	Skipjack	21·0	735					
1887	Grasshopper	19·0	525					
1887	Sandfly	19·0	525					
1887	Spider	19·0	525					
1886	Rattlesnake	18·5	550					
1881	Polyphemus	17·8	2,640					
1874	Vesuvius	9·7	245					
	Total 17 Ships	..	13,095		Total 10 Ships	..	..	3,760

* Australasian squadron.

TABLE X.—CRUISERS—UNARMOURED.

On the Stocks.

ENGLAND.			FRANCE.			RUSSIA.		
Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.
	Tons.	Knots.		Tons.	Knots.		Tons.	Knots.
Blenheim	9,000	22						
Endymion	7,350	19·75						
Gibraltar	7,700	19·5						
Grafton	7,350	19·75						
St. George	7,700	19·5						
Theseus	7,350	19·75						
Hawke	7,350	19·75						
Centaur	7,700	19·5						
Edgar	7,350	19·75						
Crescent	7,700	19·5						
Andromache	3,400	20						
Apollo	3,400	20						
Latona	3,400	20						
Melampus	3,400	20						
Naiad	3,400	20						
Sappho	3,400	20						
Scylla	3,400	20						
Sybille	3,400	20						
Terpsichore	3,400	20						
Thetis	3,400	20						
Tribune	3,400	20						
Æolus	3,600	19·75						
Astrea	3,600	19·75						
Bonaventure	3,600	19·75						

Brilliant	3,600	19·75						
Cambrian	3,600	19·75						
Indefatigable	3,600	19·75						
Intrepid	3,600	19·75						
Iphigenia	3,600	19·75						
Pique	3,600	19·75						
Rainbow	3,600	19·75						
Retribution	3,600	19·75						
Sirius	3,600	19·75						
Spartan	3,600	19·75						
Bellona	1,830	19·5						
Pallas	2,575	19·0						
Pearl	2,575	19·0	Isly	4,160	19·0			
Phœbe	2,575	19·0						
Philomel	2,575	19·0	Suchet	3,030	20·0			
*Pandora	2,575	19·0	Three ships of the Davout type modified	3,030	20·0			
*Pelorus	2,575	19·0						
*Persian	2,575	19·0						
*Phœnix	2,575	19·0	Wattignies	1,280	19·0			
*Psyche	2,575	19·0	Fleurus	1,280	19·0			
Alarm	735	21·0	Leger	450	21·0			
Antelope	735	21·0	Levrier	450	21·0			
Circe	735	21·0	Catinat	450	21·0			
Hebe	735	21·0	Iberville	450	21·0			
Jason	..	..	Lavoissier	450	21·0			
Jasseur	..	..						
Leda	735	21·0						
Niger	..	..						
Onyx	..	..						
Renard	..	..						
Speedy	..	..						

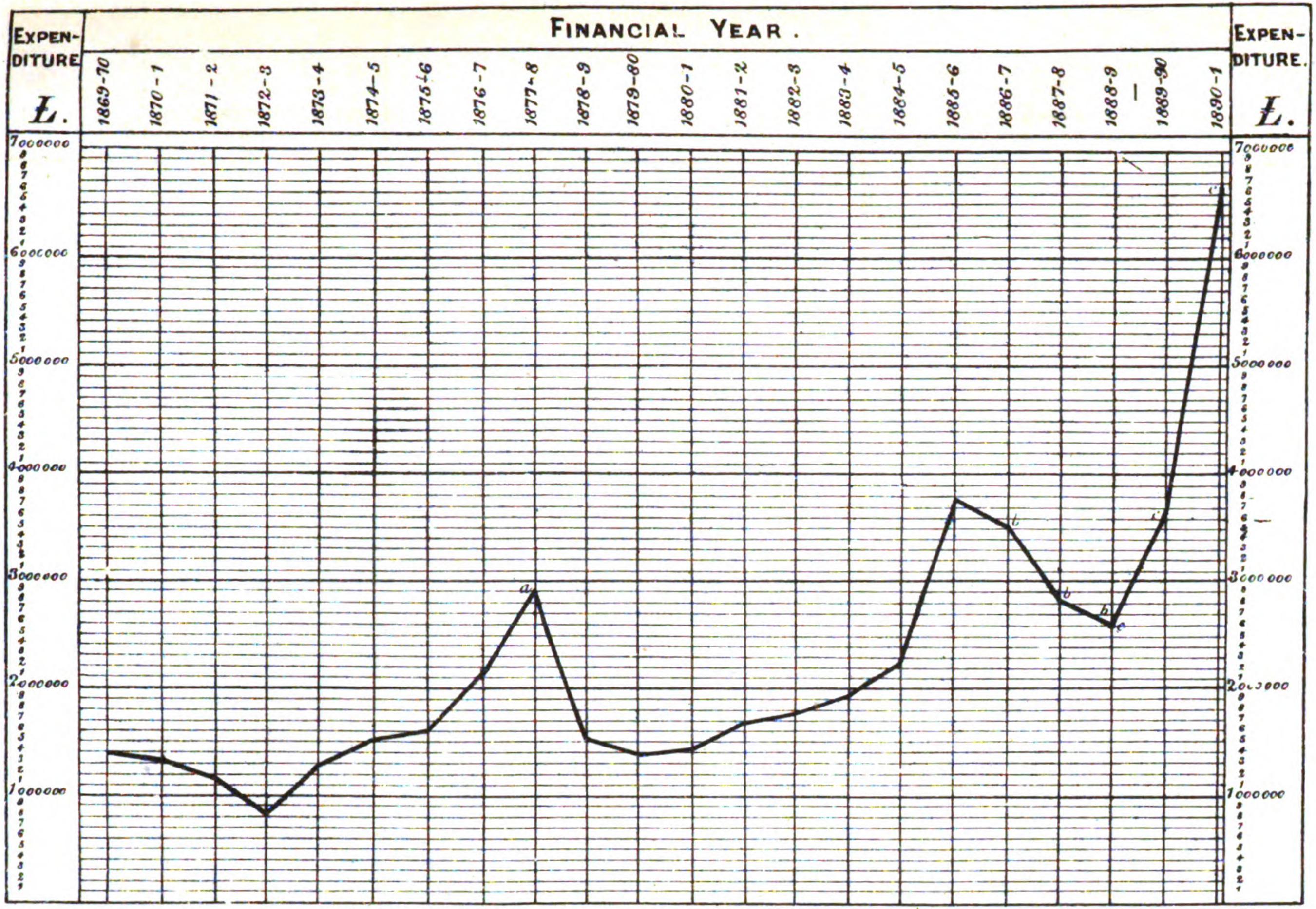
* Australian Squadron.

TABLE XI.—COMPARATIVE STATEMENT SHOWING EXPENDITURE ON CONSTRUCTION OF NEW VESSELS, HULLS AND MACHINERY, IN ENGLAND AND FRANCE, FROM 1863–64 TO 1890–91.

Year.	England.	France.	Year.	England.	France.	Year.	England.	France.
	£	£		£	£		£	£
1863–64	1,282,710	920,196	1873–74	1,290,028	789,684	1883–84	1,930,090	1,536,508
1864–65	1,674,574	873,300	1874–75	1,528,161	921,380	1884–85	2,242,070	1,510,704
1865–66	1,116,198	931,348	1875–76	1,613,218	1,054,560	1885–86	3,737,000	1,355,684
1866–67	1,014,406	875,468	1876–77	2,121,960	1,301,988	1886–87	3,495,000	1,280,000
1867–68	1,800,749	797,104	1877–78	2,922,442	1,501,884	1887–88	2,819,537	2,510,020
1868–69	1,694,362	668,780	1878–79	1,508,049	1,504,656	1888–89	2,398,805 *190,708	1,848,930
1869–70	1,387,047	655,016	1879–80	1,388,607	1,375,296	1889–90	†2,633,396	1,759,684
1870–71	1,330,814	411,948	1880–81	1,426,349	1,345,084			
1871–72	1,184,172	429,832	1881–82	1,682,500	1,400,152	1890–91	‡3,181,736 §3,595,930 6,777,666	2,396,000
1872–73	809,087	614,460	1882–83	1,767,014	1,559,644			

* Expenditure on ships building under the Imperial Defence Act of 1888. † Navy Estimates for 1889–90.
‡ Navy Estimates for 1890–91. § Additional. Provided under the Naval Defence Act.

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE TWENTY YEARS BETWEEN 1869-70 AND 1888-9



a Includes £1523,000 for purchase of Ships under the Vote of Credit.
b Includes Expenditure under Lord Northbrook's Special Programme.
c Includes Estimated Expenditure under the Defence Acts of 1888 and 1889.

1889-90 & 1890-91, are Estimates.

X.

FRENCH NAVAL ESTIMATES,

1891—1890.

French Navy Estimates for the years 1891 and 1890.

Cap.	Heads of Expenditure.	Credits proposed for the year 1891.	Credits proposed for the year 1890.	Credits voted for the year 1889.
		£	£	£
	PERSONNEL.			
1	Admiralty Office	45,708	45,708	45,708
2	Navy Pay	1,385,040	1,352,440	1,329,237
3	Marines	351,400	453,320	450,453
4	Gendarmerie Maritime	33,763	33,763	34,643
5	Inspection of Administrative and Financial Service	13,431	13,431	13,427
6	Construction Staff	82,291	82,290	83,011
7	Administrative Staff	314,324	314,324	314,323
8	Medical Staff	90,304	93,104	93,104
	LABOUR.			
	Wages—			
9	Shipbuilding; new ships; conversions; fitting for sea	407,828	378,040	398,040
10	Shipbuilding; repairs	236,160	265,948	245,948
11	Armaments; construction of new guns	37,960	41,800	32,190
12	Armaments; repairs	48,160	46,296	36,760
13	Works	51,286	51,285	51,286
14	Victualling	35,120	35,120	35,120
15	Master-attendants' and Storekeepers' Departments	279,668	277,692	290,641
16	Miscellaneous	16,268	16,268	16,268
	MATÉRIEL.			
	Stores and Supplies—			
17	Admiralty	9,696	9,696	9,796
18	Ships fitting for sea; repairs	352,000	420,000	420,000
	Carried forward	£3,790,407	£3,930,526	£3,899,960

Cap.	Heads of Expenditure.	Credits proposed for the year 1891.	Credits proposed for the year 1890.	Credits voted for the year 1880.
		£	£	£
	Brought forward . .	3,790,407	3,930,526	3,899,960
	MATÉRIEL—*continued.*			
	Stores and Supplies—*continued.*			
19	Shipbuilding; contracts for new ships .	433,760	433,760	433,760
	Supplementary for ditto . . .	360,000	..	..
20	Shipbuilding; new ships; conversions; fitting for sea	716,000	720,000	744,032
21	Armaments; manufacture of new guns .	360,000	360,000	280,000
	Supplementary for ditto . . .	40,000	..	..
22	Armaments; repairs	318,800	291,880	378,093
23	Torpedoes	145,840	97,840	99,840
24	Works; new and large alterations . .	124,960	139,360	141,382
	Ditto Supplementary for Defence of the Military Ports . . .	302,000	..	..
25	Works; repairs	57,600	57,600	57,616
26	Clothing	192,400	208,000	206,000
27	Victualling.	774,400	784,000	772,000
28	Barracks	36,222	44,080	45,081
29	Medicines	59,600	63,560	63,583
30	Machinery	222,000	252,680	254,684
31	Fuel and Lighting	33,317	33,280	33,276
32	Office Furniture, Printing and Stationery	41,800	41,480	41,491
	MISCELLANEOUS.			
33	Travelling expenses and freight . .	187,800	191,800	195,800
34	Allowance for lodgings	185,680	190,600	194,592
35	Charitable	45,950	45,950	45,950
36	Pensions to Seamen	309,073	309,073	289,040
37	Secret Service	2,600	2,600	2,600
38	Miscellaneous	10,500	10,500	10,400
39	International Exhibition	nil.	nil.	9,185
	Total . . .	£8,750,709	£8,208,569	£8,198,360

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Order for Building.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit, putting Machinery in place. Days' Work Estimated. Total to build.	Number worked 1st Jan., 1891.	Proposed for 1891.	State of advancement in hundredths. 1st January, 1891.	To advance in 1891.	Labour in 1891.
				£	Number of days.	Number of days.	Number of days.			£
Battle Ships	Neptune .	Aug. 1882	Brest . .	568,000	1,260,000	1,055,000	205,000	84	16	26,240
	Brennus .	Jan. 1889 .	Lorient .	660,000 *	1,500,000	542,000	380,000	36	25	47,6[illegible]
	Tréhouart.	" "	Lorient .	404,800	950,000	102,000	219,000	10	23	27,48[illegible]
	Magenta .	Jan. 1883 .	Toulon .	546,800	1,250,000	998,867	251,133	80	20	35,6[illegible]
	N*** . .	..	Brest . .	†	1,600,000	4,000	100,000	..	6	12,5[illegible]
	N*** . .	..	Toulon .	†	1,600,000	3,000	142,000	..	8	20,13[illegible]
										169,97[illegible]
Armoured Gunboats	Phlégéton.	Mar. 1885.	Cherbourg	108,240	310,000	192,000	118,000	62	38	15,7[illegible]
	Styx . .	Sept. 1889	Cherbourg	108,240	310,000	104,000	109,000	33	35	14,512
										30,22[illegible]
Armoured Cruisers .	Dupuy-de-Lôme .	July 1888.	Brest . .	262,680	700,000	428,000	200,000	61	28	25,60[illegible]
	Charner .	..	Rochefort.	249,000	600,000	52,000	202,000	8	33	27,5[illegible]
	Bruix . .	..	Rochefort.	249,000	600,000	3,000	80,000	..	14	10,912
										64,0[illegible]
Protected Cruisers, 1st class .	Alger . .	Nov. 1887.	Cherbourg	168,000	500,000	475,000	25,000	95	5	3,32[illegible]
	Isly . .	Aug. 1887	Brest . .	184,000	500,000	225,000	125,000	45	25	16,0[illegible]
										19,329

* The difference in the estimated cost of the Brennus in the Estimates of 1890 and 1891 is due to the large increase in the cost of the armour.
† The design is not yet approved.

BUILDING in DOCKYARDS, 1891.

Machinery.										Total Expenditure on Labour, 1891.		
		Days' Work.			Advancement in hundredths.							
Makers.	Cost.	To Complete.	Worked 1st Jan., 1891.	Proposed for 1891.	1st January, 1891.	Proposed for 1891.	Labour in 1891.	Cost of Armament. *	Total Cost of Vessel.	Hulls and Fittings.	Machinery.	Total.
	£	Number of days.	Number of days.	Number of days.				£	£	£	£	£
Indret . .	120,000	194,000	189,000	5,000	97	3	800	89,160	777,160	26,240	800	27,040
Indret-Belleville	132,000†	150,000§	23,200	80,000	15	53	12,800	92,000	884,000	47,698	12,800	60,498
Indret-Belleville	87,200‡	140,000§	..	21,950	..	15	3,512	64,000	556,000	27,489	3,512	31,001
Le Creusot .	125,000	..	..	..	..	..	..	89,160	760,960	35,613	..	35,613
..	..	..	..	..	..	..	..	..	..	12,800	..	12,800
..	..	..	..	..	..	..	..	..	..	20,137	..	20,137
							17,112			169,977	17,112	187,089
Saint Denis (Claparède)	19,400	..	..	..	100‖	..	..	14,920	142,560	15,711	..	15,711
Saint Denis (Claparède)	19,400	..	..	..	100‖	..	..	14,920	142,560	14,512	..	14,512
							..			30,223	..	30,223
Saint Denis (Société de la Loire .	119,704	..	..	..	..	..	..	33,920	416,304	25,600	..	25,600
Contract .	80,000	..	..	..	..	..	..	30,600	359,600	27,553	..	27,553
Contract .	80,000	..	..	..	..	..	..	30,600	359,600	10,912	..	10,912
							..			64,065	..	64,065
Le Creusot .	92,720	..	..	..	..	..	..	11,240	271,960	3,329	..	3,329
Indret . .	88,000	148,000	72,700	52,900	49	35	8,464	11,240	283,240	16,000	8,464	24,464
							8,464			19,329	8,464	27,793

* The hydraulic machinery for gun-mountings is included in the vote for Naval Armaments.
† This sum (£132,000) includes the estimate for Belleville boilers, of about £44,000.
‡ This sum (£87,000) includes the estimate for Belleville boilers, of about £28,000.
§ This estimate only provides for the engines; the boilers are being manufactured by contract.
‖ The machinery is complete, and paid for.

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Order of Building.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit, putting Machinery in place.					
					Days' Work Estimated.			State of advancement in hundredths.		Labour in 1891.
					Total to build.	Number worked 1st Jan., 1891.	Proposed for 1891.	1st January, 1891.	To advance in 1891.	
				£	Number of days.	Number of days.	Number of days.			£
Cruisers, 2nd class . .	Suchet .	Oct. 1887 .	Toulon .	131,600	420,000	141,070	122,497	33	29	17,371
	N*** . .	..	Cherbourg	*	..	..	33,000	..	..	4,394
	N*** . .	..	Brest . .	*	..	..	4,000	..	..	512
	N*** . .	..	Toulon .	*	..	..	2,370	..	..	336
										22,613
Torpedo Cruisers .	Wattignies	Oct. 1889 .	Rocheforte	70,200	250,000	160,000	90,000	64	36	12,276
	Fleurus .	..	Cherbourg	70,200	250,000	8,000	90,000	3	36	11,982
										24,258
Transport Sloops .	Manche .	Feb. 1886 .	Cherbourg	45,280	158,000	126,000	32,000	79	21	4,260
	Vaucluse .	May 1886 .	Rocheforte	45,560	160,000	98,500	‡	61	..	..
										4,260
Torpedo Sloops .	Léger . .	..	Lorient .	28,000	95,000	76,500	18,500	80	20	2,322
	Lévrier .	..	Lorient .	28,000	95,000	6,250	18,750	80	20	2,353
										4,675
Transport, 2nd class	Pacifique .	Aug. 1885†	Brest . .	110,000	400,000	64,449	1,000	16	..	128
Sailing Frigate .	Andromède	July 1884 .	Lorient .	73,200	180,000	42,422	‡	23	..	..

* The design of these ships not finally approved.

† The building of this vessel has been suspended since 27th January, 1890. The Estimate is for maintenance only.

‡ The building of this vessel is made to give way to other pressing work.

BUILDING in DOCKYARDS, 1891—*continued.*

Machinery.								Cost of Armament.*	Total Cost of Vessel.	Total Expenditure on Labour, 1891.		
Makers.	Cost.	Days' Work.			Advancement in hundredths.		Labour in 1891.			Hulls and Fittings.	Machinery.	Total.
		To Complete.	Worked 1st Jan., 1891.	Proposed for 1891.	1st January, 1891.	Proposed for 1891.						
	£	Number of days.	Number of days.	Number of days.				£	£	£	£	£
Indret . .	70,000	128,000	94,100	27,400	73	21	4,384	6,880	208,480	17,371	4,384	21,755
..	..	..	..	..	..	..	..	..	..	4,394	..	7,994
..	..	..	..	..	..	..	..	..	..	512	..	512
..	..	..	..	..	..	..	..	..	..	336	..	336
							4,384			22,613	4,384	30,597
Le Creusot.	40,780	..	..	..	..	..	..	5,800	116,780	12,276	..	12,276
Contract .	40,780†	..	..	..	..	..	..	5,800	116,780	11,983	..	11,983
							..			24,259	..	24,259
Indret . .	10,400	27,000	27,000	..	100	..	..	3,600	59,280	4,260	..	4,260
Indret . .	10,460	26,000	26,000	..	100	..	..	3,600	59,560	..	..	..
							..			4,260	..	4,260
Le Creusot.	18,540	..	..	..	..	..	..	1,200	47,740	2,322	..	2,322
Le Creusot.	18,540	..	..	..	..	..	..	1,200	47,740	2,353	..	2,353
							..			4,675	..	4,675
Contract .	11,400†	..	..	..	..	..	..	2,400	123,800	128	..	128
..	..	..	..	..	..	..	..	9,320	82,520	..	..	..

* The hydraulic gun-mountings are included in the vote for Naval Armaments.
† Approximate cost. Contract not entered into.

Building in Dockyards.

1891.

EXPENSES connected with the FIRST FITTING OUT and for ALTERATIONS and ADDITIONS CONSIDERED NECESSARY after TRIALS.

	£
Cherbourg	5,326
Brest	6,072
Lorient	4,972
Rochefort	323
Toulon	8,636
Indret	..
Guérigny	10,597
Total	£35,926

SUPPLEMENTAL WORK IN COMPLETING SHIPS BUILT BY CONTRACT.

1891.

Class.	Where Completed.	Number of days Estimated. For Completion.	To 1st Jan. 1891.	Expenditure in 1891.	Estimated expense due to the number of days in 1891.
					£
Torpedo Gunboats, Torpedo Boats of all Classes	Cherbourg	..	..	12,000	1,598
	Brest	..	..	1,000	128
	Lorient	..	..	1,000	125
	Rochefort	..	..	1,000	136
	Toulon	..	..	3,000	425
					2,412

Summary.

COST OF LABOUR IN THE DOCKYARDS AND GOVERNMENT ESTABLISHMENTS IN 1891 FOR NEW SHIPS, SHIPS CONVERTED, AND FOR FIRST FITTING-OUT OF NEW AND CONVERTED SHIPS.

1891.

	£
Armoured Battle Ships	187,089
,, Gunboats	30,223
,, Cruisers	64,065
First Class ,, ...	27,792
Second ,, ,, ...	26,997
Torpedo ,, ...	24,259
Transport Sloops	4,260
Torpedo Gun Boats	4,676
Transports, 2nd Class	128
Sailing Frigate—	
Cost of first fitting out, and alterations and additions to be made after trials . . .	35,926
Completion of ships after delivery by Contractors	2,413
	407,828

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Contract.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit. Advancement in hundredths. 1st January, 1891.	To advance in 1891.	Expenditure in 1891 as per Contract.	Machinery. Date of Contract.	Makers.
				£			£		
Armoured Battle Ships	Brennus	..	Lorient	660,000	..	..	..	..	Belleville. Indret.
	Tréhouart	..	Lorient	404,800	..	..	..	..	Belleville. Indret.
	Magenta	..	Toulon	546,800	..	..	..	4 Aug., 1884.	Le Creusot
	Marceau	27 Dec., 1880.	La Seyne (Société de la Méditerranée)	474,000	100	..	..	23 Apr., 1883.	La Seyne (Société de la Méditerranée)
	N*** †	..	..	..	..	..	56,000	..	..
							56,000		
Armoured Cruisers	Dupuy-de-Lôme	..	Brest	262,680	..	..	..	23 Apr., 1888.	Saint-D[illegible] (Société [illegible] la Loire)
	Charner	..	Rochefort	249,000	..	..	..	..	..
	Bruix	..	Rochefort	249,000	..	..	..	..	..
	Chanzy	18 Dec., 1889.	Bordeaux (Société de la Gironde).	247,200	10	30	77,600	18 Dec., 1889.	Le Creusot, Belleville
	Latouche-Tréville.	18 Dec. 1889.	Le Havre (Société de la Méditerranée)	247,200	10	30	77,600	18 Dec., 1889.	Société de la Méditerranée, Belleville
							155,200		

† The design of this ship not finally approved.

BUILDING BY CONTRACT, 1891.

Machinery.				Cost of Armament.*	Completion after delivery, including Armament.	Total Cost of Vessels.	Total Expenditure in 1891.		
Cost.	Advancement in hundredths. 1st January, 1891.	Advancement in hundredths. To advance in 1891.	Expenditure in 1891.				Hulls and Fittings.	Machinery.	Total.
£			£	£	£	£	£	£	£
Boilers.† 44,000 Engines. 88,000	10	16	‡14,000	92,000	..	884,000	..	14,000	14,000
Boilers.† 28,000 Engines. 59,200	10	30	‡8,800	64,000	..	556,000	..	8,800	8,800
125,000	100	§..	..	89,160	..	760,960	..	..	..
122,140	100	Balance	21,655	102,960	70,000	769,100	..	21,655	21,655
..	..	..	20,409	..	..	..	56,000	20,409	76,409
			64,864				56,000	64,864	120,864
119,704	95	§5	19,951	33,920	..	416,304	..	19,951	19,951
†80,000	20	32	26,000	30,600	..	359,600	..	26,000	26,000
†80,000	..	10	8,000	30,600	..	359,600	..	8,000	8,000
80,000	10	38	31,000	30,600	10,000	367,800	77,600	31,000	108,600
80,000	10	38	31,000	30,600	10,000	367,800	77,600	31,000	108,600
			115,951				155,200	115,951	271,151

* The hydraulic gun mountings are included in the vote for Naval Armaments.
† Approximate Estimate only. The Contract is not yet placed.
‡ The amount given is for boilers only. The engines are being manufactured at Indret.
§ There will remain a balance to be paid under the contract, depending on premiums and penalties for ...y, horse-power, and consumption of fuel.

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Contract.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit. Advancement in hundredths. 1st January, 1891.	To Advance in 1891.	Expenditure in 1891 as per Contract.	Machinery. Date of Contract.	Makers.
				£			£		
1st class Cruiser	Alger . .	..	Cherbourg .	168,000	..	..	..	6 June, 1888.	Le Creusot .
3rd class Cruisers	Cosmao .	25 Apr., 1887, and 20 June, 1888.	Bordeaux Société de la Gironde).	75,399	100	..	..	25 Apr., 1887.	Le Creusot .
	Coëtlogon .	23 May, 1887.	Penhoët (Compagnie Générale Transatlantique) . .	69,981	100	..	..	23 May, 1887.	Penhoët (Compagnie Générale Transatlantique) . .
							..		
Torpedo Cruisers	Wattignies	..	Rochefort .	70,200	..	..	..	14 Nov., 1888.	Le Creusot .
	Fleurus .	..	Cherbourg .	70,200	..	..	..	..	..
							..		
Torpedo Gun Boats .	Léger . .	..	Lorient . .	28,000	..	..	..	7 Aug., 1889.	Le Creusot .
	Lévrier .	..	Lorient . .	28,000	..	..	..	7 Aug., 1889.	Le Creusot .

BUILDING BY CONTRACT, 1891—*continued.*

Machinery. Cost.	Advancement in hundredths. 1st January, 1891.	To advance in 1891.	Expenditure in 1891.	Cost of Armament.*	Completion after delivery.	Total Cost of Vessel.	Total Expenditure in 1891. Hulls and Fittings.	Machinery.	Total.
£			£	£	£	£	£	£	£
92,720	100	..‡	..	11,240	..	271,960	..	..	..
45,207	100	Balance	6,400	2,960	12,600	136,167	..	6,400	6,400
48,269	100	Balance	6,600	2,960	12,600	133,810	..	6,600	6,600
			13,000				..	13,000	13,000
40,780	75	25§	6,797	5,800	..	116,780	..	6,797	6,797
†40,780	..	15	6,800	5,800	..	116,780	..	6,800	6,800
			13,597				..	13,597	13,597
18,540	65	35‡	6,180	1,200	..	47,740	..	6,180	6,180
18,540	65	35‡	6,180	1,200	..	47,740	..	6,180	6,180
			12,360				..	12,360	12,360

* The hydraulic gun mountings are included in the vote for Naval Armaments.
† Approximate Estimate only. The Contract is not yet placed.
‡ There will remain a balance to be paid under the contract, depending on premiums and penalties for y, horse-power, and consumption of fuel.
§ There will remain a certain amount to be paid after trials at sea and receipt of machinery, depending ontract premiums and penalties.

SHIPBUILDING PROGRAMME.—BUILDING BY CONTRACT, 1891—*continued.*

Class.	Name.	Date of Contract.	Contractor.	Contract Price of Hull, Engines, and Armament Fittings.	Hundredths. Completed on 1 Jan., 1891.	Hundredths. To be completed in 1891.	Expense in 1891 after delivery by Contractors.	Armament.	Labour and Material for first fitting not included in the Contract.	Total Cost.
				£			£	£	£	£
First Class Torpedo Boats	Nos. 130–135 inclusive	23 Jan., 1889	Le Havre (A. Normand)	61,200	100	Balance on 3 Boats	7,490	2,400	960	64,560
	Nos. 136, 137, and 138	13 Feb., 1889	Société de la Loire	30,000	100	Balance on 2 Boats	4,953	1,200	480	31,680
	Nos. 139, 140, and 141	13 Feb., 1889	Le Creusot	30,000	100	Balance on 1 Boat	2,476	1,200	480	31,680
	Nos. 142, 143, and 144	13 Feb., 1889	Société de la Gironde	30,000	100	Balance on 1 Boat	2,476	1,200	480	31,680
	Nos. N*** and N*** (No. 126 type)	..	..	25,600*	25	75	19,600†	800	320	26,720
Ditto (Coureur type)	Grondeur	..	..	19,200*	25	75	13,500†	400	160	19,760
	Véloce	..	..	19,200*	25	75	13,500†	400	160	19,760
Vedette Boats	Chélif	7 Aug., 1889	Bordeaux (Société Dyle et Bacalan)	6,860	100	Balance	1,700	480	40	7,380
	Seybouse	7 Aug., 1889	Bordeaux (Société Dyle et Bacalan)	6,860	100	Balance	1,700	480	40	7,380

ALTERATIONS AND ADDITIONS.

Alterations in the 35 mètres First-class Boats (total estimate, £60,000)	30,000
Total	£97,895

* Estimated only. The Contract has not been made.   † For ships not yet ordered, estimates are given.

Summary.

COST OF SHIPS BUILT BY CONTRACT. COST OF MATERIALS AND MACHINERY FOR SHIPS BUILDING IN THE DOCKYARDS.

1891.

	£
Armoured Battle Ships	120,864
Armoured Cruisers	271,150
1st Class Cruisers	,,
3rd Class Cruisers	13,000
Torpedo Cruisers	13,597
Torpedo Gunboats	12,360
Torpedo Boats (including 2 Vedette Boats)	97,396
Cost of Materials and Articles for use in Dockyards	553,293
Alterations while building. Premiums for Horse-power, Speed, and Consumption of Fuel	68,100
Total	1,149,760
Add Expenditure for Labour in Dockyard	407,828
Grand Total Ordinary Estimates for New Construction	£1,557,588

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Order for Building.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit, putting Machinery in place. Days' Work Estimated. Total to Build.	Number worked 1st Jan., 1890.	Proposed for 1890.	State of advancement in hundredths. 1st January, 1890.	To advance in 1890.	Lab[illegible] 189[illegible]
				£	Number of days.	Number of days.	Number of days.			£
Battle Ships	Neptune	Aug. 1882	Brest	568,000	1,260,000	839,000	230,000	66	18	29.[illegible]
	Brennus	Jan. 1889	Lorient	580,000	1,400,000	232,300	300,000	16	21	37.[illegible]
	Magenta	Jan. 1883	Toulon	546,800	1,250,000	739,030	300,000	59	24	42.[illegible]
										109.[illegible]
Coast Defence Ship	Tréhouart.	not commenced.	Lorient	*	..	10,000	158,000	..	..	19.[illegible]
Armoured Gunboats, 1st class	Phlégéthon	Mar. 1885.	Cherbourg	108,240	310,000	111,000	120,000	35	38	15.[illegible]
	Styx	not commenced.	Idem	108,240	310,000	35,000	75,000	11	24	9.[illegible]
										25.[illegible]
Armoured Cruisers	Dupuy de Lôme	July 1888.	Brest	262,680	700,000	223,000	200,000	31	28	25.[illegible]
	N***	not commenced.	Rochefort	*	..	10,000	74,000	..	..	9,[illegible]
	N***	not commenced.	Toulon	*	..	..	3,000	..	..	4[illegible]
										35,[illegible]
Cruisers, 1st class	Alger	Nov. 1887.	Cherbourg	168,000	500,000	319,000	156,000	63	31	20,[illegible]
	Isly	Aug. 1887.	Brest	184,000	500,000	170,000	110,000	34	22	14,[illegible]
	Jean Bart	Sept. 1887.	Rochefort	184,000	550,000	385,000	165,000	70	30	22.[illegible]
										56.[illegible]
Cruisers, 2nd class	Suchet	Oct. 1887.	Toulon	125,880	380,000	80,367	143,472	21	37	20.[illegible]

* The designs of these ships not having been approved at the time that this Table was prep[illegible] the number of days' work in 1889 and 1890 only is shown.

BUILDING IN DOCKYARDS, 1890.

Makers.	Cost.	Machinery. Days' Work. To Complete.	Machinery. Days' Work. Worked 1st Jan., 1890.	Machinery. Days' Work. Proposed for 1890.	Advancement in hundredths. 1st January, 1890.	Advancement in hundredths. Proposed for 1890.	Labour in 1890.	Cost of Armament. *	Total Cost of Vessel.	Total Expenditure on Labour, 1890. Hulls and Fittings.	Total Expenditure on Labour, 1890. Machinery.	Total Expenditure on Labour, 1890. Total.
	£	Number of days.	Number of days.	Number of days.				£	£	£	£	£
Indret . .	120,000	194,000	186,895	4,600	96	2	736	89,160	777,160	29,440	736	30,176
Indret Belleville .	132,000†	150,000‡	8,301	35,000	5	23	5,600	92,000	804,000	37,440	5,600	43,040
Le Creusot .	125,000	..	..	..	..	..	..	89,160	760,960	42,360	..	42,360
							6,336			109,240	6,336	115,576
Contract .	..	..	..	..	..	..	..	..	..	19,718	..	19,718
Saint Denis (Claparède)	19,400	..	..	..	..	..	..	14,920	142,560	15,720	..	15,720
Saint Denis (Claparède)	19,400	..	..	..	..	..	..	14,920	142,560	9,825	..	9,825
							..			25,545	..	25,545
Saint Denis (Société de la Loire) .	119,704	..	..	..	..	..	..	33,920	416,304	25,600	..	25,600
Contract .	..	..	..	..	..	..	..	..	..	9,886	..	9,886
Contract .	..	..	..	..	..	..	..	..	..	424	..	424
							..			35,910	..	35,910
Le Creusot .	92,720	..	..	..	..	..	..	11,240	271,960	20,436	..	20,436
Indret . .	88,000	148,000	38,120	41,000	25	27	6,560	11,240	283,240	14,080	6,560	20,640
Indret . .	88,000	148,000	98,000	50,000	67	33	8,000	11,240	283,240	22,044	8,000	30,044
							14,560			56,560	14,560	71,120
Indret . .	70,000	135,000	26,641	45,546	19	33	7,287	6,880	202,760	20,258	7,287	27,545

The hydraulic gun-mountings are included in the vote for Naval Armaments.
In this estimate of £132,000 the boilers, which are being supplied by the Belleville Co., are included at a cost of £44,000.
This figure refers only to the engines, the boilers being supplied by a private firm.

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Order to Commence.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit, putting Machinery in place. Days' Work Estimated. To Build.	Worked 1st January, 1890.	Proposed for 1890.	State of advancement in hundredths. To 1st Jan., 1890.	To advance in 1890.	Lab[illegible] in 18[illegible]
				£	Number of days.	Number of days.	Number of days.			
Torpedo Cruisers .	Wattignies	not commenced.	Rochefort .	70,200	250,000	80,500	100,000	32	40	13,[illegible]
Transport Sloops .	Manche .	Feb. 1886 .	Cherbourg	45,280	158,000	92,000	46,000	58	29	6,0[illegible]
	Vaucluse .	May 1886 .	Rochefort .	45,560	160,000	116,000	11,000	72	6	1,4[illegible]
										7,4[illegible]
Torpedo Gunboats	Léger . .	not commenced.	Lorient .	28,000	95,000	30,000	65,000	31	69	8,1[illegible]
	Lévrier .	not commenced.	Lorient .	28,000	95,000	50,000	45,000	52	48	5,[illegible]
										13,[illegible]
Sailing Frigate .	Andromède	July 1884 .	Lorient .	73,200	180,000	42,350	5,000	23	2	[illegible]
Transport 2nd class.	Pacifique .	Aug. 1885 .	Brest . .	110,000	400,000	63,449	15,000	15	3	1,9[illegible]
	N*** . .	..	Cherbourg	..	..	..	3,000	..	..	3[illegible]

Building in Dockyards, 1890.

Machinery.								Cost of Armament.	Total Cost of Vessel.	Total Expenditure on Labour, 1890.		
Makers.	Cost.	Days' Work.			Advancement in hundredths.		Labour in 1890.			Hulls and Fittings.	Machinery.	Total.
		To Complete.	Worked 1st Jan., 1890.	Proposed for 1890.	1st January, 1890.	Proposed for 1890.						
	£	Number of days.	Number of days.	Number of days.			£	£	£	£	£	£
Le Creusot .	40,780	..	..	..	..	..	..	5,800	116,780	13,360	..	13,360
Indret . .	10,400	27,000	25,897	500	95	2	80	3,600	59,280	6,026	80	6,106
Indret . .	10,400	26,000	23,796	1,604	91	6	257	3,600	59,560	1,470	257	1,726
							337			7,496	337	7,832
Contract .	20,000	..	..	..	..	..	..	1,200	49,200	8,112	..	8,112
Contract .	20,000	..	..	..	..	..	..	1,200	49,200	5,616	..	5,616
							..			13,728	..	13,728
..	..	..	..	..	..	..	..	9,320	82,520	624	..	624
Indret . .	11,400	..	..	..	..	..	..	2,400	123,800	1,920	..	1,920
..	..	..	..	..	..	..	..	..	..	393	..	393

Building in Dockyards.

1890.

EXPENSES connected with the FIRST FITTING-OUT, and for ALTERATIONS and ADDITIONS CONSIDERED NECESSARY after TRIALS.

	£
Cherbourg	4,890
Brest	6,072
Lorient	6,210
Rochefort	1,986
Toulon	9,022
Indret	..
Guérigny	10,000
Total	£38,180

SUPPLEMENTARY WORK IN COMPLETING SHIPS BUILT BY CONTRACT.

1890.

Class.	Port of completion.	Number of days estimated in 1890.	Expenditure for 1890.
		Days.	£
Battle ship Marçeau	Toulon	34,528	4,875
Torpedo sloops. Torpedo scouts. Torpedo boats.	Cherbourg	10,000	1,310
	Brest	1,000	128
	Rochefort	1,000	134
	Toulon	1,000	141
			6,588

Summary.

EXPENDITURE ON LABOUR IN DOCKYARDS, 1890. For NEW SHIPS, SHIPS CONVERTED, and the FIRST FITTING-OUT of NEW and CONVERTED SHIPS.

1890.

	£
Battle ship	115,576
Coast defence ironclad	19,718
Armoured gunboats	25,545
Armoured cruisers	35,910
Cruisers. First class	71,120
„ Second class	27,546
Torpedo cruiser	13,360
Transport sloops	7,832
Torpedo sloops	13,728
Sailing frigate	624
Transport. Second class	1,920
N***	393
Fitting for sea, and alteration after trials.	38,180
Completion of ships after delivery by contractors	6,588
Total	£378,040

NOTE.—The cost of wages has been estimated upon the following averages:—

	Francs per diem.
Cherbourg	3·275
Brest	3·20
Lorient	3·12
Rochefort	3·34
Toulon	3·53
Indret	4·53
Guérigny	3·85

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Contract.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit. Advancement in hundredths. 1st January, 1890.	To advance in 1890.	Expenditure in 1890 as per Contract.	Machinery. Date of Contract.	Makers.
				£			£		
Battle Ships .	Brennus .	..	Lorient . .	580,000	..	..	..	4 Aug., 1884.	Belleville .
	Magenta .	..	Toulon . .	546,800	..	..	..	23 Apr., 1883.	Le Creusot .
	Marçeau .	27 Dec., 1880.	La Seyne (Société de la Méditerranée) . .	474,000	100	Balance	73,689		La Seyne (Société de la Méditerranée) .
							73,689		
Coast defence ironclad	Tréhouart.	..	Lorient . .	..	..	..	..	..	..
Armoured Cruisers	Dupuy-de-Lôme .	..	Brest . .	262,680	..	..	..	23 Apr., 1888.	Saint-Denis (Société de la Loire) .
	N*** . .	..	Rochefort .	..	..	..	..	..	..
	N*** . .	..	..	..	..	..	40,000	..	..
	N*** . .	..	..	..	..	..	40,000	..	..
	N*** . .		Toulon . .	..	..	..	..	..	..
							80,000		
Cruiser, 1st class.	Alger . .	..	Cherbourg .	168,000	..	..	..	6 June, 1888.	Le Creusot .

BUILDING BY CONTRACT, 1890.

Machinery.				Cost of Armament.	Completion after delivery.	Total Cost of Vessel.	Total Expenditure in 1890.		
Cost.	Advancement in hundredths. 1st January, 1890.	Advancement in hundredths. To advance in 1890.	Expenditure in 1890.				Hulls and Fittings.	Machinery.	Total.
£			£	£	£	£	£	£	£
{ 44,000 88,000 }	18	54	24,000	92,000	..	804,000	..	24,000	24,000
125,000	98	2	20,833	89,160	..	760,960	..	20,833	20,833
122,140	100	Balance	39,492	102,960	70,000	769,100	73,689	39,492	115,701
			84,325				73,689	84,325	158,014
..	..	..	32,000	..	..	..	..	32,000	32,000
119,704	85	15	19,951	33,920	..	416,304	..	19,951	19,951
..	..	..	32,000	..	..	..	..	32,000	32,000
..	..	..	32,000	..	..	..	40,000	32,000	72,000
..	..	..	32,000	..	..	..	40,000	32,000	72,000
..	..	..	..	..	..	..	..	..	..
			115,951				80,000	115,951	195,951
92,720	85	15	..	11,240	..	271,960	..	..	..

SHIPBUILDING PROGRAMME.—

Class.	Names of Ships.	Date of Contract.	Where Building.	Estimated Cost, exclusive of Machinery and Armament.	Hulls, Fittings, Outfit. Advancement in hundredths. 1st January, 1890.	To advance in 1890.	Expenditure in 1890 as per Contract.	Machinery. Date of Contract.	Makers.
				£			£		
Cruisers, 3rd class	Surcouf .	..	Cherbourg .	82,600	..	..	..	2 Aug., 1886.	Saint-Denis (Société de la Loire .
	Lalande .	21 Mar., 1887, and 20 June, 1888.	Bordeaux (Société de la Gironde).	73,575	100	..	..	21 Mar., 1887.	Le Creusot .
	Cosmao .	25 Apr., 1887, and 20 June, 1888.	Idem . . .	73,575	100	..	..	25 Apr., 1887.	Le Creusot .
	Coëtlogon	23 May, 1887.	Penhoët (Compagnie Générale Transatlantique) . .	66,400	100	..	..	23 May, 1887.	Penhoët (Compagnie Générale Transatlantique) . .
							..		
Torpedo Cruiser	Wattignies	..	Rochefort .	70,000	..	..	..	14 Nov., 1888.	Le Creusot .
Torpedo Sloops .	Léger . .	..	Lorient . .	28,000	..	..	..	..	..
	Lévrier .	..	Idem . . .	28,000	..	..	..	..	..
							..		

BUILDING BY CONTRACT, 1890.

Machinery.				Cost of Armament.	Completion after delivery by Contractors.	Total Cost of Vessel.	Total Expenditure in 1890.		
Cost.	Advancement in hundredths. 1st January, 1890.	Advancement in hundredths. To advance in 1890.	Expenditure in 1889 as per Contract.				Hulls and Fittings.	Machinery.	Total.
£			£	£	£	£	£	£	£
45,661	100	Balance	7,400	2,960	..	131,221	..	7,400	7,400
44,800	100	Balance	6,400	2,960	12,600	133,935	..	6,400	6,400
44,800	100	Balance	6,400	2,960	12,600	133,935	..	6,400	6,400
46,600	100	Balance	6,600	2,960	12,600	128,560	..	6,600	6,600
			26,800				..	26,800	26,800
40,780	70	30	6,797	5,800	..	116,580	..	6,797	6,797
20,000	40	60	12,000	1,200	..	49,200	..	12,000	12,000
20,000	60	40	12.000	1,200	..	49,200	..	12,000	12,000
			24,000				..	24,000	24,000

1890.

Torpedo Boats.

Class.	Date of Contract.	Makers.	Contract price.	Advancement in Hundredths.		Expenditure, as per Contract.	Cost of Armament.	Total Cost.
				To 1st Jan., 1890.	To advance in 1890.			
			£			£	£	£
Torpedo Boats, First class :—								
Nos. 130–135 inclusive . .	23 Jan., 1889	Le Hâvre (A. Normand) .	61,200	100	Balance	15,120	2,800	64,960
Nos. 136, 137, and 138 . .	13 Feb., 1889	Société de la Loire . .	30,000	85	15 (including Balance)	12,504	1,200	31,680
Nos. 139, 140, and 141 . .	13 Feb., 1889	Le Creusot . . .	30,000	85	15 (including Balance)	12,504	1,200	31,680
Nos. 142, 143, and 144 . .	13 Feb., 1889	Société de la Gironde .	30,000	85	15 (including Balance)	12,504	1,200	31,680
						52,632		

Summary.

COST OF SHIPS BUILT BY CONTRACT. COST OF MATERIALS AND MACHINERY FOR SHIPS BUILDING IN THE DOCKYARDS.

1890.

Class.	Expenditure.
Battle ships	£158,014
Coast defence ironclad	32,000
Belted cruisers	195,951
Cruiser. First class	..
„ Third class	26,800
Torpedo cruiser	6,797
Torpedo sloops	24,000
Torpedo boats	52,632
Materials, dockyard construction	553,019
Alterations, contingencies, and premiums for horse-power and speed	104,547
Total	1,153,760
Add Dockyard Expenditure for Labour	378,040
Grand Total Ordinary Estimates for New Constructions	£1,531,800

XI.

The French Navy Estimates for 1890.

I.—REPORT OF THE COMMITTEE. By M. GERVILLE-RÉACHE, *Member of the Chamber of Deputies.*

"CAP. XX.—SHIPBUILDING: STORES PURCHASED FOR SHIPBUILDING, FOR CONVERSIONS, AND FOR THE FIRST FITTING OUT OF NEW OR CONVERTED SHIPS.

"A comparison of the shipbuilding programme for 1889, which is to be found at the end of the Report with that for 1890, provokes practically the same remarks.

Proposed to lay down four ships.

"The Department proposes to put four new ships on the stocks, because it is necessary to occupy the workmen of Lorient, Rochefort, Toulon, and Cherbourg. With a totally different system it might have considered the desirability of pressing forward the work already in hand. The Navy is too apt to forget that, for the purposes of war, every ship on the stocks is useless; and that for this reason it is necessary to restrict as much as possible the number of ships in construction, and to concentrate the expenditure in pressing forward a few vessels.

* * * * * *

"The programme of 1890 shows that the yearly estimates are by no means exact.

Inaccuracy of the Navy Estimates.

"In fact on going through the column of hundredths to be built from the 1st January, 1890, numerous differences will be found with the total number of days' work executed up to the 1st January, 1889, and that of the number of days' work estimated for 1889. One example will suffice to illustrate the bearing of this remark. Amongst the ironclads on the stocks take the first, the Neptune. According to the shipbuilding programme for 1889, the Neptune had $\frac{62}{100}$ths. of her hull completed on January 1st, 1889; and $\frac{20}{100}$ths. additional were estimated for 1889. On January 1st, 1890, she should have been advanced to $\frac{82}{100}$ths. But is actually far from

that state of advancement. In the programme for 1890 we find that on the 1st January, 1890, she will only have been advanced to $\frac{66}{100}$ths. A similar observation may be made with regard to the Brennus, Magenta, Phlégéton, Styx, Dupuy de Lôme, Alger, Isly, Jean Bart, Suchet, Manche, Vaucluse, Leger, Servia, Andromede.

"The idea of accelerating the progress of some of the work in hand at the expense of other work may be the cause of these differences; such a course is still open to criticism, for it is contrary to the programme submitted to the two Chambers. Moreover, there is no reason why the labour programme should not indicate the work which requires despatch and that which can be postponed.

Armoured cruisers of the Dupuy de Lôme type.

"It will be remarked that the Department is putting on the stocks three armoured cruisers of the Dupuy de Lôme type, and that five more are to be ordered. If the type does not succeed, instead of one failure there will be eight, and instead of £416,304 (which each of these vessels cost), £3,330,432 will be risked at the same time. This appears a dangerous proceeding, and has succeeded very badly in the case of torpedo boats. The Navy would do well to abandon it.

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The names of engineers in charge of ships building should be published.

"We are anxious that the name of the engineers in charge of the construction of a ship should be published for many reasons. First, because this publicity will give them a greater interest in the rapidity and economical execution of the work under their charge. Secondly, because this publicity will be an additional encouragement for the building of successful ships, and in case of failure will mark with whom the responsibility lies. Finally, it will show in another way the slow progress of work in the dockyards by giving the names of the engineers placed successively in charge of the construction of the same ships.

II.—M. Bardoux's Report to the Senate on the Supplementary Estimates.

To the Report of the Commission on the Estimates for the Navy, we subjoin the following extracts from the Report to the Senate by M. Bardoux on the Supplementary Estimates.

"If we enter in detail into the use that is to be made of the credit of £2,320,000, which you are asked to grant, it is easy to prove the urgency of providing for the needs of the Navy.

Three ironclads of 6000 to to 7000 tons.

"Thus, among the ships to be built there are first three ironclads of 6000 to 7000 tons. We do not wish on this point to make an actual comparison, which would be difficult on account of the variety of types, and because it would be necessary to define the rôle of certain vessels in actual warfare, a task which is not within our competence. It will suffice to say that of five coast-defence ironclads, some disappear altogether from the Navy List, some cease to have any real value for fighting purposes. The three ironclads proposed will be coast-defence vessels of a superior type, and with a fourth which will be constructed from the ordinary resources will be sufficient to fill the gap that has been created.

Torpedo gunboats and torpedo-boats.

"The bill concludes with the proposal to build four torpedo gunboats, ten sea-going torpedo-boats, thirty coast-defence torpedo-boats.

"If we add to the effective torpedo-boats, all those on the stocks, the actual situation is as follows:—

Germany	170	Torpedo-boats.
Italy	145	"
France	146	"

Numbers compared with those for Germany and Italy.

"The two former powers together have 315 torpedo-boats against 146. The urgent necessity of making good some of this enormous deficiency cannot be disputed. It is the justification for building forty sea-going or coast-defence torpedo-boats. The justification of the demand for the four torpedo gunboats is no less complete. Reckoning the effective vessels as before, France possesses eighteen of this useful class. A direct comparison with foreign navies is almost impossible, because the variety of types prevent any comparative classification; but it is admitted that there should be a torpedo-gunboat to every ironclad. The gunboats will therefore help to make good one amongst many too patent deficiencies of the Navy.

"The demand for a supplementary vote is therefore justified, bearing in mind that £2,100,000 are destined for hulls and machinery and £220,000 for armament.

Cruisers.

"Your Committee is, however, especially desirous of knowing whether the number of cruisers, who in maritime warfare play the part of scouts, is sufficient for the defence of the country. The figures which have been put forward, reckoning as before those ships which are to be placed on the stocks, gives us the following result:—

Germany	40	Cruisers.
Italy	23	"
England	130	"
France	55	"

"The considerable effort we have recently made in constructing cruisers places us in this respect in a much better position than we were in a few years ago.

"If there is a serious effort which still remains to be made, it is in the matter of battle-ships. The number of effective vessels, as far as the diversity of classification permits a comparison, is as follows:— **More battle-ships required.**

England	55
Germany	16
Italy	13
France	21

"These figures comprise, besides new ships and those still in course of construction, all the ironclads which can be usefully placed in line of battle.

"But it must not be forgotten that six of our ironclads are built of wood, and that three, the Océan, Marengo and Suffren, are about to be struck off the *Navy List*. The three others, the Colbert, Trident, Richelieu, will in a few years have lost their value as battle-ships. They must therefore be replaced without much delay. **Ineffective French battle-ships.**

"We appeal to the ever watchful patriotism of the Senate, and we ask it, in the name of the Committee on Finance, to vote the Bill adopted by the Chamber of Deputies, with these observations: 1. That it will only be necessary to open a credit of £240,000 for the financial year 1890, the remainder being spread over one year; 2. That all the expenditure proposed will appear in the ordinary estimates, and will be charged, according to the ministerial declarations, on the available resources of the ordinary Budget."

* * * * * *

The law which was passed unanimously was as follows:—

"The Minister of Marine is authorised to order to be built by contract, in addition to the ships mentioned in the shipbuilding programme, as part of the Budget, the ships hereafter mentioned, for which the total expenditure is estimated at £2,320,000, viz.: **Bill passed.**

3 ironclads of 6700 tons.
4 torpedo gunboats.
10 sea-going torpedo-boats.
30 coast-defence torpedo-boats.

III.—Article in 'Le Yacht.' By M. Weyl.

We subjoin extracts from an article in *Le Yacht* by M. Weyl, the well-known writer on naval affairs, which give an idea of outside French opinion.

M. Weyl's article in *Le Yacht*.

"The Senate has approved the vote of £2,320,000 passed by the last Chamber of Deputies at one of the ordinary sittings of 1889.

"The ironclads, which it is apparently intended to build, are coast-defence vessels of a modified Furieux type; the torpedo gunboats are to be improved 'Bombes'; while for the sea-going torpedo-boats there is a choice between the Coureur, Agile, Avant Garde and Aventurier types. The coast-defence torpedo-boats will probably be 34 mètre (112-feet) boats. It is unnecessary to repeat that the only serious observations to make are concerning the ironclads; many officers and engineers think that a better type might have been found than the one which has been selected, and of which a specimen, the Amiral Trèhouart, is already in course of construction. The characteristic of the type consists in low extremities so as not to interfere with the fire of the turrets; but this advantage is counter-balanced by a vital defect: the low bow renders the sailors' work difficult, and picks up the sea to such an extent that the water finds its way easily through the fore-turret into the fore-deck. The English know by experience the disadvantage of this feature, and for this reason they have gradually enlarged the Admiral type to the Nile, and now to the Royal Sovereign, which has a free board of 18 ft. 6 in. It is well known that the inhabitability of the Admiral class has been demonstrated in the summer manœuvres, whenever the weather has been bad; and if the Admiralty has modified the large ironclads it is as much in the interest of the crews, as to increase the defensive power of these vessels. But when will our Navy recognise that it is necessary to provide the men with healthy and comfortable quarters as far as the limits of possibility allow? A coast-defence vessel may in harbour be a sufficiently comfortable habitation, but it is quite another thing at sea in bad weather. In France we are too much inclined to neglect the well-being of the crews; it might moreover be said that in the trials and manœuvres, for fear of any damage occuring, we avoid any experiment which may enlighten us as to the defects of our battle-ships.

The Admiral, Nile, and Royal Sovereign classes.

"But let us come back to the £2,320,000.

M. Bardoux.

"The report on these Estimates drawn up by M. Bardoux in the name of the Finance Committee of the Senate, contains some infor-

mation on which a few words must be said. The honourable Senator remarks that the Ordinary Budget only allots £1,800,000 to shipbuilding. 'This grant,' says he, 'is no longer sufficient for renewing our material in view of the great efforts which neighbouring powers are now making to increase their naval forces to the utmost point compatible with their resources.' M. Bardoux further reminds the Chambers that Germany last year voted £6,240,000 for the increase of the Navy, and as this did not include torpedoes, torpedo-boats, or guns, the actual expenditure under the programme will amount to more than £8,800,000.

Italian expenditure.

"As for Italy," he adds, "we only know that in 1888–89 the expenditure on shipbuilding and quick-firing guns amounts to £1,960,000, and that presumably in 1889–90 this expenditure will be about maintained.

"To the above we must add some figures which will give a clear idea of the naval ambition of Germany and Italy.

German expenditure.

"It appears from the Estimates for 1890–91 that the German Government intends to spend £4,400,000 in the course of the present financial year. The Ordinary Estimates amount to £1,920,000 in round numbers. The expenditure on fixed and floating material, which is considered to be of an exceptional character, amounts to £600,000; finally the Supplementary Estimates amount to £1,907,677, which more than make up the total of £4,400,000 already mentioned. M. Bardoux further informed the Senate that the extraordinary expenditure in the programme of 1888 would exceed £8,800,000.

* * * * *

Italian expenditure.

"As for Italy, she continues her progress against wind and tide, and in spite of a deficit. Last year she spent £5,720,000 on the Navy, £2,480,000 of which were under the head of Extraordinary Estimates. For 1889–90 she asks for the respectable sum of £4,779,673, £600,000 of which are charged to extraordinary expenditure. Last year she alloted £1,840,000 to shipbuilding, and £520,000 to the fortifications of Maddalena, which are being established directly against us. The grant for shipbuilding exceeds that provided in our Ordinary Estimates, and it may well be affirmed that if we do not take care the Triple Alliance will be able in a few years to put in line a more powerful fleet than our own. We shall then, from a naval point of view, be in a situation of extreme peril. As England wishes to be in a position to resist a coalition of any two powers, ought not we in the same way to make it our aim to be on a level with the two continental powers whose maritime ambition is now so plainly brought to light? The one hopes, in the near future,

to be able to make a good figure in the North Sea, the other has already taken in the Mediterranean a position with which it behoves us to take account of."

* * * * *

Supplementary Estimates.

As regards the Supplementary Estimates for £2,320,000, it appears hardly probable that the contract for the ironclads can be concluded before the end of the year, which would postpone the laying of the first keel-plates of the large vessels till the second quarter of 1890. The torpedo gunboats will be decided on at the same time; the coast-defence torpedo-boats will probably not be ordered till the trials of the 112-feet boats have taken place. Finally, the selection of a type for the torpedo-scouts will be sufficiently difficult, because we are confronted by several designs which have given satisfaction. It is, however, safe to say that several of these little vessels will be constructed after a slightly modified design of the Coureur, which was ordered by M. Barbey in 1887.

The thing of chief importance now is to press vigorously forward the building of these vessels, and with this object the Minister of Marine must be requested:—1st. To insist that there should be as little delay as possible in the final completion of the ships. 2nd, To resist absolutely the demands for economy which the Minister of the Treasury will not fail to put forward. The sum available for new ships in 1890 has been fixed at £240,000. If the constructors could spend £240,000 to £480,000 in the course of this financial year, should they be prevented from actively prosecuting the work they have in hand in deference to financial considerations?

XII.

Italian Estimates, 1890-91.

NAVY ESTIMATES.—FINANCIAL YEAR 1ST JULY, 1889, TO 30TH JUNE, 1890.

ORDINARY EXPENDITURE—GENERAL EXPENSES.

	£
Admiralty	37,010
Expenditure on various services connected with the Mercantile Marine	266,720

EXPENDITURE FOR NAVAL SERVICES.

Ships fitting out, in reserve and completing	237,164
General Staff of the Navy	109,730
Corps of Constructors	41,539
Commissariat Service	43,196
Medical Service	25,160
Wages—Men	451,085
Gratuities	31,500
Assistants to Constructors	38,479
Accountants	12,177
Police	10,761
Telegraph Service	9,240
Telegraph Materials	8,800
Provisions	349,533
Lighting	8,307
Hospital Services	22,910
Honorary Distinctions	1,020
Fuel	134,000
Salaries and Wages—Workshops and Fortifications	12,312
Training Establishments	30,081
Naval Academy	13,000
Scientific Services—*Personnel*	3,932
„ „ *Matériel*	15,640
Law Charges	1,220
Transport	49,680
Materials for repair of Ships	451,400
Labour for same	300,000
Guns, Torpedoes and Small Arms	307,200
Labour for construction and repair of Armaments	68,000
Works Department—Repairs	87,600

	£
Completion, 1st class Battle Ship (Re Umberto) . . Completion, 3rd „ „ Ships (2) . . . . . Building three 1st class Ships . . . . . . „ nine 2nd „ „ . . . . . . „ six 3rd „ „ . . . . . . „ Sea-going and Harbour Defence Torpedo Boats „ Tenders and Harbour Vessels . . . „ Steam Launches . . . . Ships to commence:— Two 1st class Ships . . . . Four 3rd class Ships . . . . Sea-going Torpedo Boats . . . . . . Tenders. . . . . Steam Launches	1,080,000
Naval Expenditure at Massowah.	106,040
	4,060,706
Rents for lands occupied by Government	93,756

EXTRAORDINARY EXPENDITURE.

Half Pay	4,000
Shipbuilding	256,000
Naval Yard at Taranto	40,000
Works at Dockyard, Spezzia	50,000
„ „ Venice	10,000
Fortifications, Maddalena	64,000
Torpedoes	60,000
Quick-firing Guns	20,000
	£500,000

The Italian Naval Estimates for the year ending June 30, 1890, show a total of £5,100,000. The Estimates make provision for the erection of sixty-four coast semaphore stations, while twenty-nine further stations are contemplated.

The proposed expenditure includes amounts for the following vessels under construction;—First-class vessels, Rè Umberto, Sicilia, and Sardegna; second-class vessels, Fieramosca, Etruria, Umbria, Liguria, Lombardia, and Marco Polo; third-class vessels, Partenope, Minerva, Aretusa, Urania, and two unnamed ships; as well as torpedo-avisos, and seagoing torpedo-boats, torpedo-launches, and vessels for local purposes.

During the financial year ten vessels of the first, second, and third-class, as well as torpedo-avisos and sea-going torpedo-boats and vessels for harbour service, are to be laid down.

The project presented to the Italian Chamber by Admiral Brin, Minister of Marine, includes a demand for £140,000 for the purchase of coal for the Navy. It also proposes the expenditure of £60,000 for ammunition of a new type for the Navy.

XIII.

German Navy Estimates, 1890-91.

EXPENDITURE UNDER THE SEVERAL VOTES.

Head of Service.	Voted 1890-91.	Voted 1889-90.
	£	£
Admiralty Office	37,767	37,166
Hydrographic Office	9,310	8,000
Observatory	11,790	11,787
Salaries, Wages, and Contingencies in Scientific Department	10,810	9,899
Martial Law	1,477	1,477
Divine Service	2,370	2,313
Wages, Officers and Men	472,158	444,898
Shipbuilding, Repairs	312,915	313,040
Victualling	144,394	122,722
Clothing	5,715	5,692
Care of Barracks and Buildings	47,855	46,437
Lodging Allowances	38,095	35,745
Medical	32,000	35,375
Travelling Expenses and Freight	25,462	26,388
Training Establishments	8,095	7,590
Building of Ships and Works	517,485	501,728
Guns and Fortifications	108,141	107,521
Torpedo and Mining Gear	78,133	50,151
Pilotage, Buoyage, Lights	10,197	10,197
Miscellaneous	10,129	8,510
Total . . . £	1,914,379	1,786,656

Expenditure on Special Service.

Ordinary.

	£
Submarine Miner	30,000
Corvette H.	100,000
Cruiser D.	45,000
Armoured Battle-ship A.	155,000
" " B.	155,000
" " C.	155,000
" " D.	155,000
Ironclad P.	100,000
" Q.	100,000
Two Torpedo Vessels	10,000
Ironclad R.	75,000
" S.	75,000
Corvette J.	115,000
" K.	115,000
" L.	115,000
Cruiser E.	70,000
Cruiser to replace Adler	70,000
" " Eber	70,000
Sloop G.	60,900
" H.	60,900
" for Admiralty	75,000
Floating Crane	15,000
Torpedo Machinery	2,835
Armament Battle-ships A. B. C. and D.	40,000
" Ironclads P. Q. R. and S.	120,000
Reserve Armament	12,600
Armament, Corvette H.	27,800
" Cruiser D. and of Cruisers to replace Adler and Eber	37,500
" Sloops G. and H.	11,000
Enlargement of Magazines, Wilhelmshaven	2,375
Equipment and Armament of Ships for Torpedo Service	26,500
Miscellaneous	163,191
	£2,365,601

Extraordinary.

	£
Armament, Ironclad O.	4,427
Armament, &c., for Defences of Mouth of Elbe	70,000
Projectiles for Battle-ships, Cruisers, and Torpedo-Boats	17,250
Thirty Torpedoes	12,000
Equipment of Submarine Miner	2,000
Sundry Buildings and Works	48,400
" " at Wilhelmshaven	5,000
	£159,077

XIV.

Russian Navy Estimates, 1890.

CALCULATED AT RATE OF EXCHANGE, JANUARY 1890, *i.e.*, £1 = 9 Roubles

	£
Central Administration	198,198
Rewards, Pensions, Education of Children	52,295
Naval Schools	59,972
Medical	82,343
Wages	391,714
Provisions	97,290
Clothing	103,380
Navigation	585,353
Hydrographic Office	37,885
Guns and Torpedoes	315,355
Construction	1,555,662
Workshops and Offices	274,372
Hire, Maintenance, Construction, and Repair of Buildings .	341,244
Religion	39,157
Sundries	100,417
Total	£4,354,839

N.B.—The total last year was at the current rate of exchange £3,610,120, but it would be a grave error to suppose that this indicates a serious increase in the estimates. The amount in roubles last year was 39,383,129, and this year 39,193,553; the difference in exchange does not affect prices directly to any great extent, and the estimates may be considered practically the same.

PROGRAMME FOR 1890.

Baltic Fleet:—

Practical squadron: Frigates, Herzog Edinburgsky, Admiral Spiridoff, Admiral Chichagoff, Admiral Greig, Admiral Lazareff; turreted gunboats, Smerch, Charodeika; corvette, Rynda; clippers, Stryelok, Oprichnik, Plastoun, Vyestnik; steamers, Dnyepr, Ilmen; schooner, Slavyanka, four torpedo-boats, eight spar torpedo-boats.

Gunnery school division: Coast service ironclads, Pervenets, Kreml; turreted gunboat, Rusalka; gunboat, Tucha.

Mining school division: Cruiser, Africa; gunboat, Mina; torpedo-boat (first-class) Vzriff, one torpedo-boat, seven spar torpedo-boats; steam-hulk, Bogatir (for pupils of mining school); hulk, Gilyak, and one spar torpedo-boat (for diving operations).

Naval school division: Frigate, Kynaz Pojarsky; corvettes,

Scobeleff, Bayan, Boyarin, and one spar torpedo-boat; gunboat, Snyeg (for pupils of the technical school).

In foreign waters: Frigate, Vladimir Monomakh; cruisers, Admiral Nakhimoff, Admiral Korniloff; clippers, Kreiser, Djigit; gunboats, Mandjur, Bobr, Sivuch. The cruiser Pamyat Azova and corvette Vityaz will leave for the Pacific. The Razboynik (clipper) and Minin (frigate) return to Cronstadt, whence the Minin will take a party of recruits for a cruise in the Atlantic.

The ironclads Emperor Nicolas I., Emperor Alexander II., ironclad gunboat Grozyashtchy, and Imperial yacht Polyarnaya Zvyezda, the last two being still on the stocks as yet, will undergo machinery trials and complete for sea.

A spar torpedo-boat, with a Hodgkiss gun, will be commissioned for two months for the use of the Naval Rifle School.

For hydrographic work in the Baltic: one gunboat and several small vessels.

For harbour service at Cronstadt: the transport Krasnaya Gorka and cruiser Asia, the latter serving as school for engineers and stokers; also several steamers and one Whitehead torpedo-boat, the latter being manned three months by pupils of the technical school, and one month by quartermasters and engineers.

At the disposal of the Emperor's flag captain (*i.e.* for guarding the Imperial Palace at Peterhof) the steamer Posilny, gunboat Shtchit, two torpedo-boats, and four steam cutters.

The practical squadron will be in commission three months, the gunnery and mining divisions four months, naval school division three months.

Black Sea:—

Practical squadron (commissioned for four months): Ironclads, Empress Catherine II., Tchesma, Sinope; cruiser, Pamyat Merkuria; gunboats, Kubanets, Terets; torpedo cruisers, Capitan Saken, and Kazarsky, and three first-class torpedo-boats.

For torpedo practice: Schooner, Gonets, one first-class and two other torpedo-boats.

Caspian Sea:—

Astrabad Station: Gunboat, Pishtchal; steamer, Baku.

Baku Station: Steamers, Geok Tepe, Krasnovodsk.

Siberian Station:—

(1) Schooner Aleüt for torpedo and diving practice; first-class torpedo-boats Yanchikhe and Suchena, and three torpedo-boats (second-class); the schooner commissioned for seven months, the torpedo-boats for three.

(2) For hydrographic and lighthouse purposes the schooner Tunguz (eight months), and gunboat Gornostai (six months).

(3) For protecting Seal Island, the schooner Kreiserok (now missing, and supposed lost at sea).

(4) In foreign waters: Gunboats, Mandjur, Bobr, Sivuch; the first-named for four months; second, six months; third, ten months.

Altogether the *personnel* in foreign waters will be:—1 admiral, 31 fleet staff officers, 89 officers, and 77 supernumeraries, 18 officers of marine artillery, 28 fleet pilots, 42 engineers, 22 doctors, 20 pursers, 6 chaplains, 4328 men; total, 4662 of all ranks.

In home waters: 10 admirals, 166 fleet staff officers, 457 officers, and 151 supernumeraries, 53 officers of marine artillery, 218 fleet pilots, 189 engineers, 3 constructors, 83 doctors, 98 pursers, 18 chaplains, 349 cadets, 15,956 men, and 524 hired men; total, 18,275 of all ranks. Grand total in foreign and home waters, 23,937 officers and men.

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